ONE DOLLAR PER COPY

the OIL AND GAS JOURNAL

APRIL 20, 1959

How Atlantic reduced parts inventory 20% p. 113

Oil staging a comeback, but excessive runs are a threat ▸ 57

New flooding technique puts water in at gas-oil contact ▸ 60

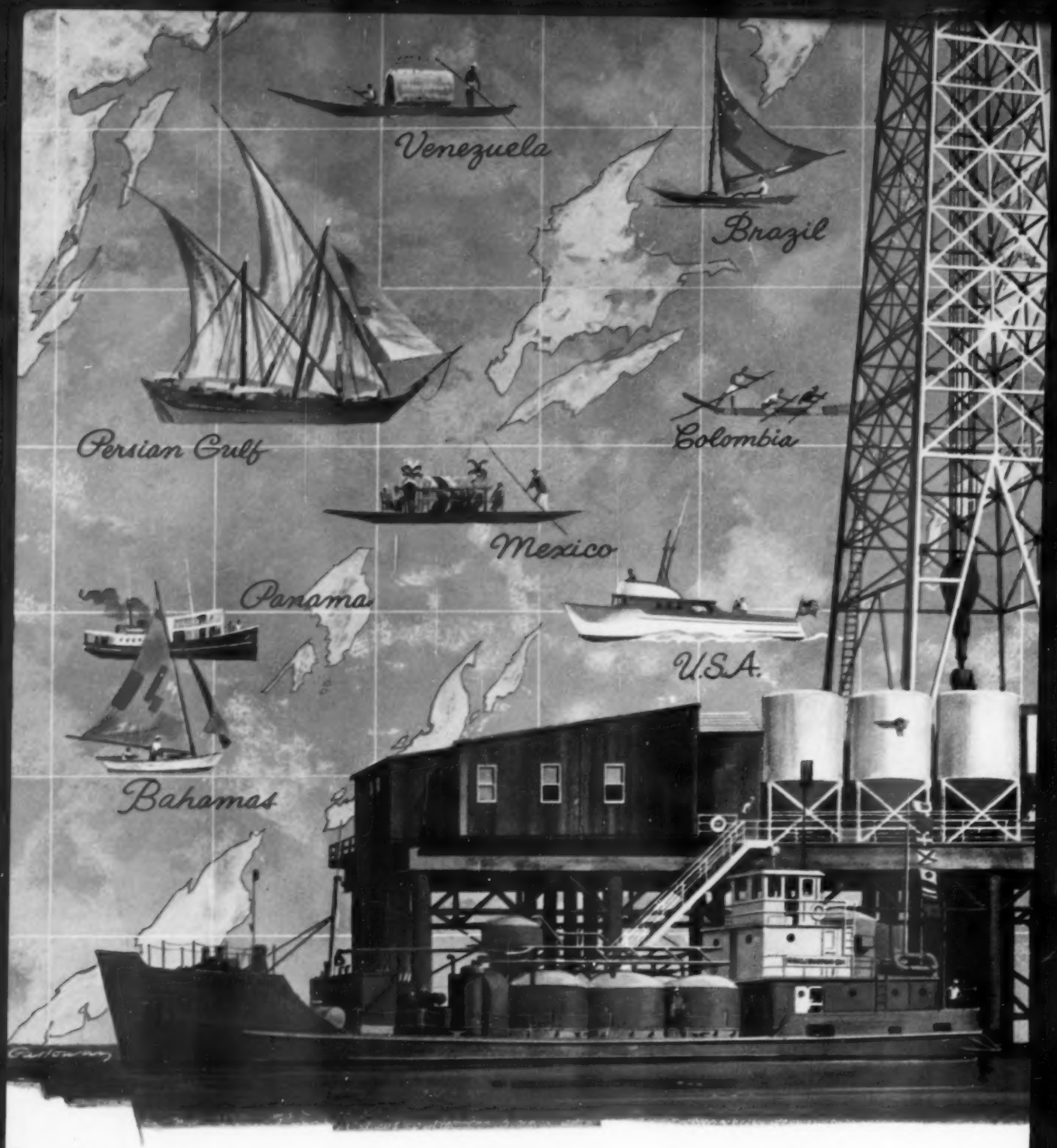
Recovery methods aimed at "attic" and "cellar" oil ▸ 62

It's new!

Gas Turbines For Fluid-Bed Processes . . .

result of 4,000-hour test proves feasibility of power recovery in cat cracker system

p. 94



Charting the Course of Progress...

Underway... round the world... Halliburton sea-going men and equipment take the helm to chart the course of petroleum progress in the free-world's waterways. Halliburton's seaworthy "force for oil" is dedicated and always ready to provide maritime oil well services and materials in the many ports of call for the oil industry's off-shore requirements.

HALLIBURTON OIL WELL CEMENTING COMPANY

DUNCAN, OKLAHOMA

the OIL AND GAS JOURNAL Newsletter

Tulsa, Okla.
April 20, 1959

New import quotas have touched off frenzied trading:

Importers have been swamping inland refiners with offers to trade domestic crude for their import quotas.

As result of bidding which at times was nearly hectic, most majors now have acquired all the imports they need. Only two still are reported seeking crude swap-outs.

Deals cover mandatory allocations until July 1. Then new controls will be announced.

Inland refiners are showing a profit on the deals. Their margin ranges from 30 to 90 cents per barrel. Most are in the 60 to 80-cent range.

Those swapping at the lower end of the range are getting some other kind of concession, possibly better crude or crude not available before.

This margin can be very lucrative over a year's operation. One domestic refiner who swapped his voluntary quota last year got about 55 cents extra.

This means a 5,000 bbl. daily quota is worth at least $1,000,000 yearly.

▼ ▼ ▼

Watch what happens to refinery runs in next few weeks. They hold key to industry prosperity rest of year (p. 57).

Crude runs have been too heavy. They set a record in first quarter. Product imports also hit a peak.

Result: Product stocks didn't decline as much as normal in February. They actually turned up in March and matched midsummer levels.

This oversupply threatens product prices. If they go sour, the upward profits trends enjoyed in first quarter may start wilting.

New switch in pushing superpremium Gulfcrest is being tried by Gulf.

It's now advising motorists to fill up with a tankful every 1,000 miles to renew peak performance. It could bolster sales among the bulk of motorists whose cars manage very nicely on the two lower grades.

Industrywide sales of third grades have generally been less than stimulating. Marketers hesitate to be quoted directly but general feeling is that total sales run below 5% of gross gasoline sales—a disappointing figure.

Regular gasoline may be boosted 2 octane numbers on the Great Lakes products pipeline.

Shippers are being polled on raising from 89 to 91.

Mid-Continent marketers say they want to stay competitive in quality. That will be reason for any boost taken.

Pocket-sized buzzers are finding favor in some larger refineries for contacting personnel.

The units serve as radio receivers tuned into a central transmitter. A coded impulse sent out from the transmitter actuates a buzzer only in the particular receiver desired. The person so alerted simply calls into the central operator from the nearest telephone for his message.

The system is helpful both under routine conditions and for emergencies.

Tip to refiners: Put a meter on your flare lines, calibrate it in dollars per year.

You'll be surprised at how fast upsets are corrected when plant personnel appreciate the money going down the drain —or up the stack in this case.

One plant did this and cut its flare losses by one-third, simply by changing the dial on an existing meter.

▼ ▼ ▼

Highest well pressures ever recorded have been controlled by Tidewater in testing important Louisiana discovery.

The 2 Lacassane wildcat registered 11,300 psi. flowing through ⅛-in. choke. Shut-in tubing pressure was 11,690 psi. Calculated bottom-hole pressure exceeded 14,000 psi.

Production through choke was at rate of 2,600 M.c.f. of gas daily with liquid recovery of 87.5 bbl. of 48.2°-gravity condensate per million cubic feet (p. 66).

South Mississippi's deep-drilling play gets hotter. And to add to the fun a shallow play is being revived.

More than 30 rigs are busy in wildcat drilling to Cretaceous and lower horizons at depths of 10,000-15,000 ft. So far this year 75 wildcats have been completed, 7 of them good for field openers.

Total completions for first 3 months in state rose to 165, more than 60 above number drilled in same period last year (p. 76).

Drilling plans are buzzing as expected in Montezuma County of southwestern Colorado. The spark is furnished by two big

Pennsylvanian strikes at Towaoc and at Lion's 1 Retherford 8 miles north.

Wildcat is planned by California Co. and Superior in the Towaoc-Marble Wash area. Sinclair already is working at two wildcats east and southeast of Towaoc. Lion plans more work near its dual-zone strike. The 1 Retherford was completed last week from Bluff and Ismay zones for more than 900 bbl. daily.

Colorado Oil & Gas is about to suspend drilling at its Yakutat Unit 3 in Alaska after testing some small shows.

Well reached 10,848 ft. total depth. It is third wildcat drilled by Colorado on south shore of Alaska's Yakutat Bay.

Company now plans geophysical work about 50 miles south of Yakutat Unit 3 and will drill a fourth well if conditions warrant. Colorado is unit operator for itself, Continental, and Frankfort Oil on a 1,100,000-acre spread.

Exploration notes:

New producing zone for North Dakota may be coming up. It's the Lodgepole of Mississippian age. Amerada recovered mud-cut oil on test of zone at an east extension to Antelope field in McKenzie County.

Nevada drilling will pick up on strength of three deep tests slated for Clark County, 160 miles south of state's only production at Eagle Springs in Nye County.

About 458,000 acres of submerged lands off the coast of Florida will be put up for sale May 26 by U. S. Bids will be taken for 80 tracts in Marquesas area off the Florida keys.

Major new technique for waterflooding has been developed by Core Lab.

It works like this: Water is injected at the gas-oil contact rather than the oil-water contact as in the conventional method.

Core Labs has assigned the patent to operators making first use of process in Colorado's Adena field (p. 60).

▼ ▼ ▼

Latest talk on Phillips decision: Even if examiner's ruling is accepted by FPC, the precedent may not be applied to all gas going into interstate commerce.

Reason: Cost-of-service formula tends to reward inefficient producers with higher prices. There is now talk of an industry-wide price formula to be used in setting rates for small producers. But it too might vary from area to area.

Price of Ringwood gas in Oklahoma is being raised as result of out-of-court settlement.

Under renegotiated contracts producers will net 4.9 cents at wellhead for raw casinghead gas and another 0.85 cents in 1963. They get an additional 2.5 cents from the gas liquids

which will be stepped up 0.5 cents per M.c.f. in 1960.

Previously, producers netted 2.5 cents per M.c.f. for liquids until the processing plant and gathering system were paid off.

The compromise settled a case which would have tested the state's authority to order higher gas prices as a way of achieving conservation (p. 72).

▼ ▼ ▼

Pattern for wage increases in pipeline construction may have been formed by new contracts reported for highway construction.

These rates generally provide the basis for pipeline contracts and this year call for increases of 10 to 15 cents for laborers and operating engineers.

First major underground storage project for gas in Pacific Northwest is planned in Lewis County, Wash.

Pleasant Valley Gas & Oil of Vancouver hopes to develop storage capacity for an estimated 60-billion cubic feet of gas in two projects at Jackson Prairie. Critical test holes will probably be drilled this year.

The lease is on the route of Pacific Northwest Pipeline which runs south from the Canadian border. Pleasant Valley is owned by Western Development & Power, Ltd., and Van-Tor Oils & Explorations, Ltd.

▼ ▼ ▼

Oklahoma legislature has started hearings on bill, which would open door to wider spacing.

Proposed amendment would eliminate present 40-acre maximum spacing for oil wells less than 9,900 ft. deep. It would give Corporation Commission power to order wider spacing (p. 72).

Oil industry so far has escaped major tax levies in Texas and Colorado legislatures.

In Texas, a 3% severance beneficiary tax on dedicated gas reserves has been dropped. Industry will be tapped by several minor tax changes (p. 74).

In Colorado, bill was passed which will trim deductions on corporation taxes. Change will cost state oil firms about $175,000 annually.

Industry notes: That long-talked Skelly-Tidewater merger will take about 4 to 8 months to complete...Venezuelan price cuts also have been posted now by Mobil Oil and Texas Petroleum. Cuts earlier were by Shell and Creole...Product imports have tumbled under mandatory controls. They totaled 550,500 bbl. last week compared with 1,342,200 bbl. daily the previous week.

The Oil and Gas Journal is published weekly with an additional issue in January by The Petroleum Publishing Co., 211 S. Cheyenne, Tulsa 3, Okla. Second-Class postage paid at Tulsa, Okla. Copyright 1959 by The Petroleum Publishing Co. United States and foreign rates to the petroleum industry, 1 year $5, 2 years $8, 3 years $10.

Good Wells Make Good News

A Monthly Report on Wells That Are Now Worth More

April 20, 1959

Every day Dowell engineers develop profit-building new ways to use acid to help operators get better production from oil and gas wells. Here are four examples:

- **St. Landry Parish, South Louisiana** (Old Gas Well) Production from the tight Miocene sand between 9533 feet and 9543 feet was only 1600 mcfd, with 62 barrels of distillate per million. With the help of the Dowell engineer, the operator selected a treatment consisting of 2500 gallons Super Mud Acid and 1500 gallons 15 per cent inhibited acid. Both acids had a Dowell silicate control agent added. This treatment was selected because of past success using about 200 gallons Super Mud Acid per foot of pay. After clean-up, gas production rose to 2400 mcfd. The $1725 treatment paid out in two weeks.

- **Hansford County, Texas Panhandle** (New Gas Well) This wildcat was completed through perforations from 6535 to 6546 feet. Producing zone was the Atoka lime. Before treatment, the well tested 1250 mcfd. Dowell acidized using two strengths of acid with silicate control and demulsifying agents added. 5000 gallons of 7½ per cent acid was followed by 6500 gallons of 4 per cent. Treatment was down casing at 9 bpm. After well had cleaned up, it tested 4000 mcfd.

- **Carter County, Oklahoma** (New Oil Well) Before treatment, this well tested only a show of oil. It had been completed into the highly reactive Upper Chimney Hill lime from 7912 to 7922 feet. The operator called Dowell. 7500 gallons of Retarded Acid were used in a treatment to open up a larger drainage area. After clean-up, the well tested 14 boph.

- **Southern Alberta, Canada** (Water Disposal Well) This old oil well was originally completed open hole in the Madison dolomite from 8557 to 8790 feet. After depletion, the operator wanted to convert it to water injection, but well would not take water at 2000 psi. Well was corroded. Also iron hydroxide precipitate had resulted from previous acid jobs, and deposits of paraffin and other heavy hydrocarbons were suspected. To treat all problems simultaneously, Dowell recommended Stabilized Acid and magnesium pellets. 300 pounds of pellets in gelled water were followed by 1000 gallons Stabilized Acid. After clean-up, well took water on vacuum.

In some wells, tailored acid treatments by Dowell have succeeded where all other stimulation efforts have failed. Whatever your production problem, call your Dowell representative. He may be able to save a well that would otherwise be abandoned. For full information, call any of the 165 Dowell service points. In Canada, call Dowell of Canada, Ltd.; in Venezuela, United Oilwell Service. Dowell, Tulsa 1, Oklahoma.

Services for the oil industry DOWELL

DIVISION OF THE DOW CHEMICAL COMPANY

the OIL AND GAS JOURNAL APRIL 20, 1959 • VOLUME 57 • NUMBER 17

TULSA OFFICE
211 South Cheyenne Ave.
Phone LUther 4-4411

THE STAFF

George H. Weber ..... Editor
Henry D. Ralph ..... Chief Editorial Writer
Ted A. Armstrong ..... News Editor
Gerald L. Farrar ..... Engineering Editor
Dr. Frank J. Gardner ..... Exploration Editor
Paul Reed ..... Pipeline Editor
John C. Reidel ..... Petrochemical Editor
W. L. Nelson ..... Technical Editor
Lynn M. Nichols ..... Presentation Editor
John C. Casper ..... Economics Editor
W. B. Bleakley ..... Production Editor
Neil Williams ..... Associate Editor
Peter B. Bike ..... Geophysical Editor
Carl J. Lawrence ..... Assistant News Editor
Gene T. Kinney ..... Assistant Pipeline Editor
R. B. Tuttle ..... Equipment Editor
C. Dudley Johnston ..... Art Director
Carl Hoot ..... District Editor
John C. McCaslin ..... District Editor
W. A. Bachman ..... District Editor
Robert B. Bixal ..... District Editor
Deacon New ..... District Editor
Merle F. Blakely ..... District Editor
Sara Bangert ..... District Editor
Max L. Batchelder ..... Asst. Pres. Editor
Helen Brown ..... Editorial Assistant
Alice Burt ..... Editorial Assistant
Ailleen Cantrell ..... Editorial Assistant
Susan Boeckman ..... Editorial Assistant
Margaret Higgs ..... Editorial Assistant
Jo Jeanne Speaker ..... Staff Artist
E. P. Stadler ..... Staff Artist

NEW YORK OFFICE
500 Fifth Avenue
Phone LOngacre 4-1910

Paul Swain ..... International Editor
Larry Rosen ..... Refining Editor
Ray G. Gibson ..... District Editor
John P. O'Donnell ..... District Editor

HOUSTON OFFICE
802 American Investors Building
Phone CApitol 4-7726

Ed McGhee ..... Drilling Editor
Howard M. Wilson ..... District Editor

DALLAS OFFICE
1238 Mercantile Building
Phone Riverside 8-3074

Robert J. Enright ..... District Editor

LOS ANGELES OFFICE
650 South Grand Avenue
Phone MAdison 2-0722

D. H. Stormont ..... West Coast Editor
William T. Smith ..... District Editor

WASHINGTON OFFICE
621 Albee Building
Phone District 7-1710

Joe Reilly ..... Washington Editor

Correspondents at Denver, Pittsburgh, Calgary, Columbus, Ashland, Ky., Oil City, Pa., Mount Pleasant, Mich., Melbourne, Australia; Regina, Sask.; Chatham, Ont.; Casper, Wyo., and Anchorage, Alaska.

POSTMASTER: Send notification (Form 3579) regarding undeliverable magazines to The Oil and Gas Journal, 211 S. Cheyenne, Tulsa 3, Okla.

SUBSCRIBERS: Send subscription correspondence and change of address to The Oil and Gas Journal, 211 S. Cheyenne, Tulsa 3, Okla. Subscribers should notify publisher promptly of any change of address, giving old as well as new address, and including city postal delivery zone, if any. If possible, enclose an address label from a recent issue of the magazine. Allow one month to six weeks for change to become effective.

IN THE NEWS

General Interest:

Refinery Runs Hold Key to '59 Economic Outlook 57
Florida Offshore Sale Scheduled in May 61
Skelly-Tidewater Merger Gets Under Way 61
Import Appeals Board Holds First Public Hearing 65
Humble Sells Big New Mexico Spread 67
Big Tax Bite Is Likely in Texas 70
Out-of-Court Settlement Raises Ringwood Gas Prices 72
California Governor Hits Oil for More Taxes 74

Pipelining:

Pipeline Briefs 67
Texas Senate Weighs Controversial Pipeline Bill 74
Shell Automates Big Rancho Crude Line in Texas 78
FPC Hears New Plan to Move Canadian Gas to Midwest 78

Foreign News:

Iraqi Pressure for Bigger Oil Profits Worries French 80
New Libya Discovery Tests 100 Bbl. Per Hour 81
Belgian Congo Has World's Strangest Gas Field 82
British Honduras Offers New Exploration Parcels 83
Aussies Seek New Capital to Push Papua Oil Search 83
American Independent Has New Refinery in Kuwait 83

Exploration:

Processing Briefs 72
Octane Boost Proposed by Great Lakes Pipe Line 77

Processing:

New Water-Flood Technique Is Proving Successful 60
Gulf Coast Operators "Rescue" Attic and Cellar Oil 62
Third Texas Field Gets 160-Acre Oil-Well Spacing 64
Wider Spacing Gets Strong Backing in Oklahoma 72
Arkansas Producers Plan Pollution Reduction 74
Texas Approves Big Dollarhide Unit 78

Drilling-Production:

Tidewater Completes High-Pressure Test in Louisiana 66
Mississippi Is Hottest Deep Drilling Area 76
Deep Hunton Well May Be Oklahoma's Strike of Year 169
In One Gulf Coast Area, Oil Hunters Wade to Work 170

OIL AND GAS PIPELINES • REFINING • PETROCHEMICALS
EXPLORATION • DRILLING • PRODUCTION • FIELD PROCESSING

. . . an integrated magazine serving an integrated industry

TECHNOLOGY—OPERATION

Drilling-Production

How You Can Save With Tubingless Completions 84

By C. B. Corley, Jr., and J. L. Rike

It is practical and economical to use conventional tubing and casing in completing and servicing wells. Such wells can be produced, worked over, fractured, treated for sand consolidation, and artifically lifted. Too, such wells can be single or multiple completions.

Better Sand Consolidation in Oil and Gas Wells 91

By J. H. Edwards, R. E. Williams, and C. L. Prokop

An improved plastic technique effectively consolidates lost sands. A catalyst preflush, a phenol-formaldehyde plastic solution, and a cresol-oil overflush are used. No rig is needed; about 24 hours is required. About 80% of the field treatments have been successful.

Reservoir Engineering—8 120

By E. T. Guerrero and F. M. Stewart

Measurement of effective premeability using linear flow and compresible fluid and using linear flow and noncompressible fluid.

Pipelining

Computer Evaluates Design of Gas Gathering System 89

By L. R. Henry and R. B. Peritz

Use of high-speed digital computers in the design of a gas-gathering system has been proved practical and can be considered a common engineering department procedure. The Hardy Cross iterative technique is used.

Reclaiming Tank Bottoms by Solvent Treating 127

By Gene Kinney

About 30 pipeline and refinery tanks have been treated successfully with one paraffin-suspending chemical. Generally 65 to 85% of the bottoms are reclaimed. The paraffin is recovered and the cleaning is carried out most effectively.

Refining-Processing

Power-Recovery Gas Turbines for Fluid-Bed Cat Crackers 94

By J. C. Dygert

A 4,000-hour test at Shell's Montreal refinery has proved feasibility of a gas turbine in several applications. Gases containing fluid catalyst can be used in the turbine after passing through a primary separator where most catalyst particles are removed.

Practical Pointers on Gas Chromatography 105

By A. J. Miller

Here's a panel discussion from the Oklahoma City regional meeting of Natural Gasoline Association of America. Purpose of the discussion is to give the plant man the answers to his questions on the practical use of chromatography in gas processing plants.

Gas Chromatography at TGP's La Porte Fractionating Plant 111

By John W. Askins

This analytical tool allows prediction of reflux to towers and temperature changes needed, reduces shutdowns and fluctuations, enables daily checking of inlet and slop streams, and finds leaky valves which are destroying product quality.

Atlantic Saves Money by Accent on Parts Interchangeability 113

By Larry Resen

An extensive reorganization of the stores system at Atlantic's Philadelphia refinery is providing for a 20% reduction in inventory. Savings each year as a result of the program are projected at the rate of 10% of base inventory investment. Program leans heavily on punched-card and computer techniques.

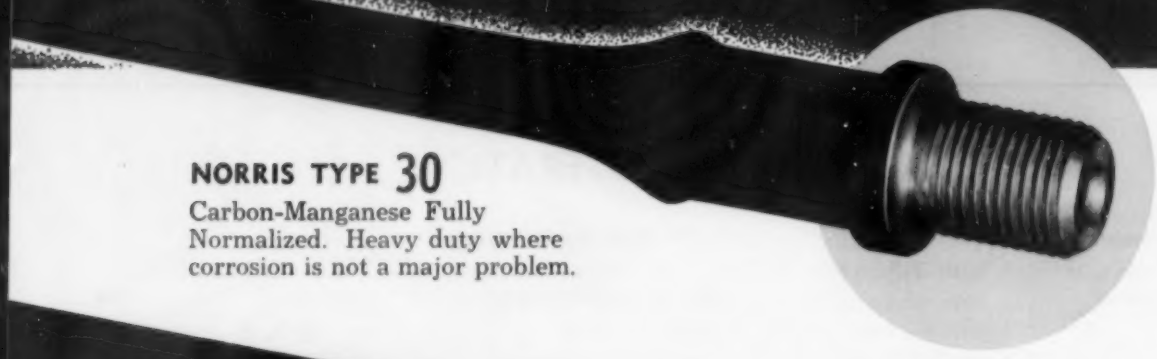
Questions on Technology 123

Gas produced in platinum catalyst reforming.

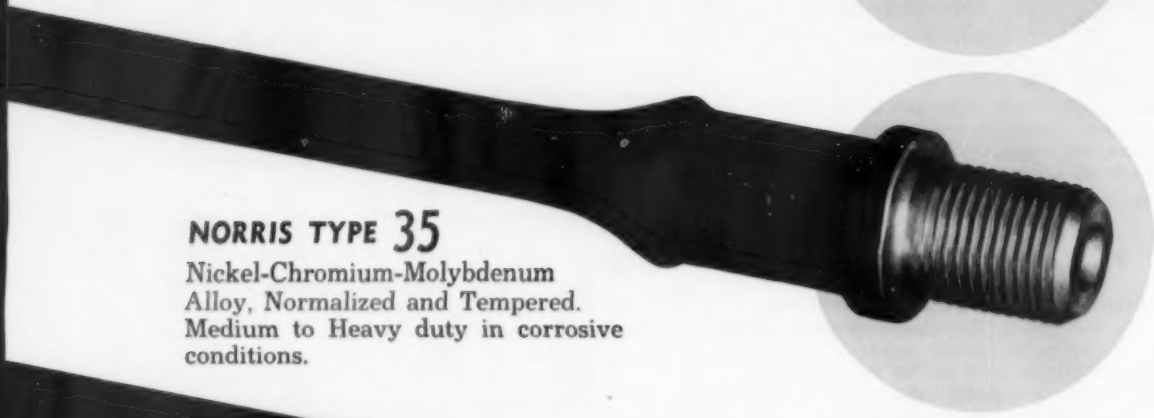
DEPARTMENTS

Advertisers' Index	199	Equipment Men in the News	153	Production Statistics	192
Calendar of Events	48	Exploration Highlights	169	Questions on Technology	123
Classified Advertising	196	Foreign News	80	Refining Statistics	193
Deaths in the Industry	188	Journally Speaking	53	Statistical Summary	190
Drilling Contractors	133	Markets	194	They Say	44
Drilling Statistics	191	New Equipment	137	Trade Literature	147
Editorial	55	Personals	185	Watching Washington	59

NORRIS MAKES FINE SUCKER RODS . . .
WE DO APPRECIATE YOUR BUSINESS

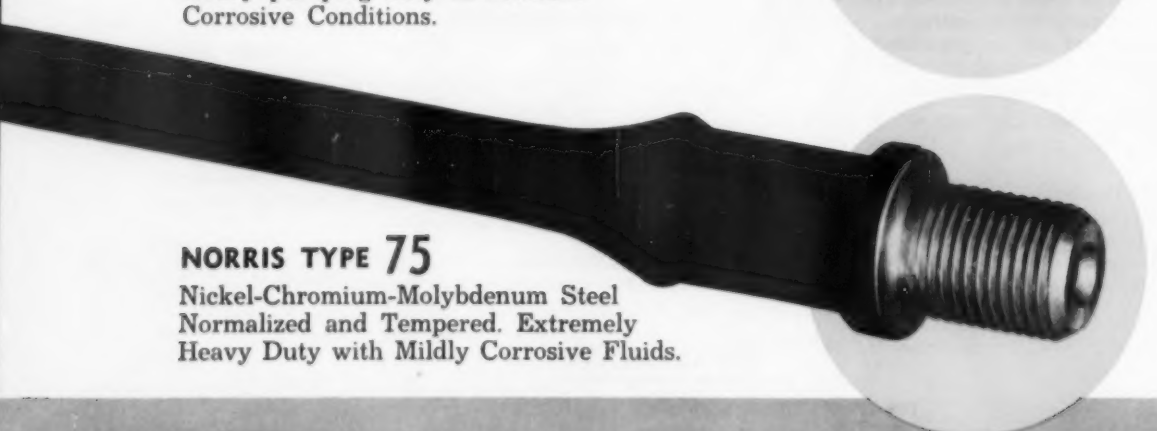


NORRIS TYPE 30
Carbon-Manganese Fully Normalized. Heavy duty where corrosion is not a major problem.



NORRIS TYPE 35
Nickel-Chromium-Molybdenum Alloy, Normalized and Tempered. Medium to Heavy duty in corrosive conditions.

NORRIS TYPE 40
Nickel-Molybdenum-Alloy Normalized and Tempered. Heavy pumping duty in Medium Corrosive Conditions.



NORRIS TYPE 75
Nickel-Chromium-Molybdenum Steel Normalized and Tempered. Extremely Heavy Duty with Mildly Corrosive Fluids.

NORRIS QUALITY
SUCKER RODS
POLISHED RODS - COUPLINGS

W. C. NORRIS, MANUFACTURER
DIVISION OF DOVER CORPORATION
TULSA, OKLAHOMA

Buy From Your NORRIS Distributor

BRANCHES: Great Bend, Kansas; Corpus Christi, Houston, Kilgore, Odessa, Wichita Falls, Texas; Oklahoma City, Oklahoma; Salem, Illinois; Casper, Wyoming; Farmington, New Mexico.

See Norris Exhibit at International Petroleum Exposition, May 14-23, Near Main Entrance

TELETAX* TELEMETERING

by Foxboro...

engineered for the most advanced transmission techniques

Telemetering matched in performance with famous Foxboro instruments — that's the Foxboro Teletax Telemetering System.

Through use of impulse-duration signals, Teletax electrically transmits measurements of a remotely-located variable to the central control station. Here, the Teletax receiver records the duration of impulse, which is directly proportional to the measured variable.

The Foxboro Teletax System is noted for its simplicity, its versatility, and its high sustained accuracy. For a transmission medium, it can use either AC or DC, an audio frequency carried on a transmission line, or radio or microwave impulses. Sustained accuracy is 0.5% of full scale.

TELETAX RECEIVERS

Teletax receivers include: Single or Dual Receivers; Multi-Record Receivers for recording up to 6 separate measurements on one chart; and Teletax Receiver-Controllers for automatic operation. And the Teletax signal can be simply converted to digital information.

TRANSMISSION LINK

With Foxboro's Teletax Telemetering System, you can use the most advanced transmitting techniques: two wire lines, power lines, radio or microwave. As many as 25 different signals can be handled in each direction, simultaneously.

TELETAX TRANSMITTER

The Teletax Transmitter houses either one or two standard Foxboro measuring elements — plus the Teletax transmitting mechanism. It will transmit to a control center hundreds of miles away just as easily as to one nearby. It also indicates or records locally if desired.

The Teletax Transmitter needs no periodic maintenance whatever, while the receiver requires only occasional oiling. And the receiver has a minimum of mechanical components to wear — no clutch to slip or jam.

Foxboro Teletax Systems are now in wide use on natural gas systems, water works, oil fields, power plants, steel mills, etc. Write for Bulletin 17-11C — it gives all the details. **The Foxboro Company, 604 Neponset Avenue, Foxboro, Mass.**

FOXBORO
REG. U.S. PAT. OFF.
TELETAX TELEMETERING

PUSH . . . not pull . . . raises this all-new "Oilwell" Lever-Lift Mast!

Look at this schematic drawing!

See how the lifting power from the draw works is first applied through the wire line system at a point near the center of the mast while in horizontal position . . .

. . . and how this power, using leverage principles, pushes against the front legs until the mast reaches an upright drilling position—approximately one degree from vertical.

The lifting levers then lock into place with an automatic wedge-type mechanism and become the front legs of the mast—an integral part of the unit.

. . . and note these design features

1. Main tower consists of five sections which may be transported on two semi-trailers and one truckload.
2. Sections are assembled at ground level by means of "T" bolts and patented built-in wedge-lock fasteners which tighten in use.
3. Raising mechanism is on the forward part of the substructure and operates in front of the hinge points, permitting use with any make draw works.
4. Snubbing is unnecessary. An overtravel stop makes it impossible to pull this mast over backwards.
5. Patented cross-over crown block assembly, with fast line and dead line outside the mast, equalizes leg loading. It also permits stringing the traveling block with flat side facing and fast line away from the derrickman.
6. Eccentric hinge pins in each leg facilitate centering and leveling of the crown block.

For complete information . . . contact your "Oilwell" representative. He will be glad to give you the full story.

USS and "Oilwell" are registered trademarks

Oil Well Supply Division of USS United States Steel

Branches Serving All Oil Fields **Executive Offices**—Dallas, Texas **Area Offices**—Calgary, Alberta · Casper, Wyoming · Columbus, O. Dallas, Texas · Houston, Texas · Tulsa, Okla. · Los Angeles, Calif. **Export Office**—30 Rockefeller Plaza, New York 20, N. Y.

Two ways of providing
EXPOSURE PROTECTION

TOO LATE ▲
to prevent serious heat exposure, a valiant attempt is made by firefighters to prevent rupture of tankage, not already involved in flames, with relatively ineffective hose streams.

GRINNELL WATER SPRAY SYSTEM ▶
shown under test at the Marietta, Ohio plant of the Bakelite Union Carbide Plastic Company, a division of the Union Carbide Corporation. Water – when it is applied in time and distributed over the surfaces efficiently by a properly engineered system – is most effective in limiting tank fires and controlling their spread.

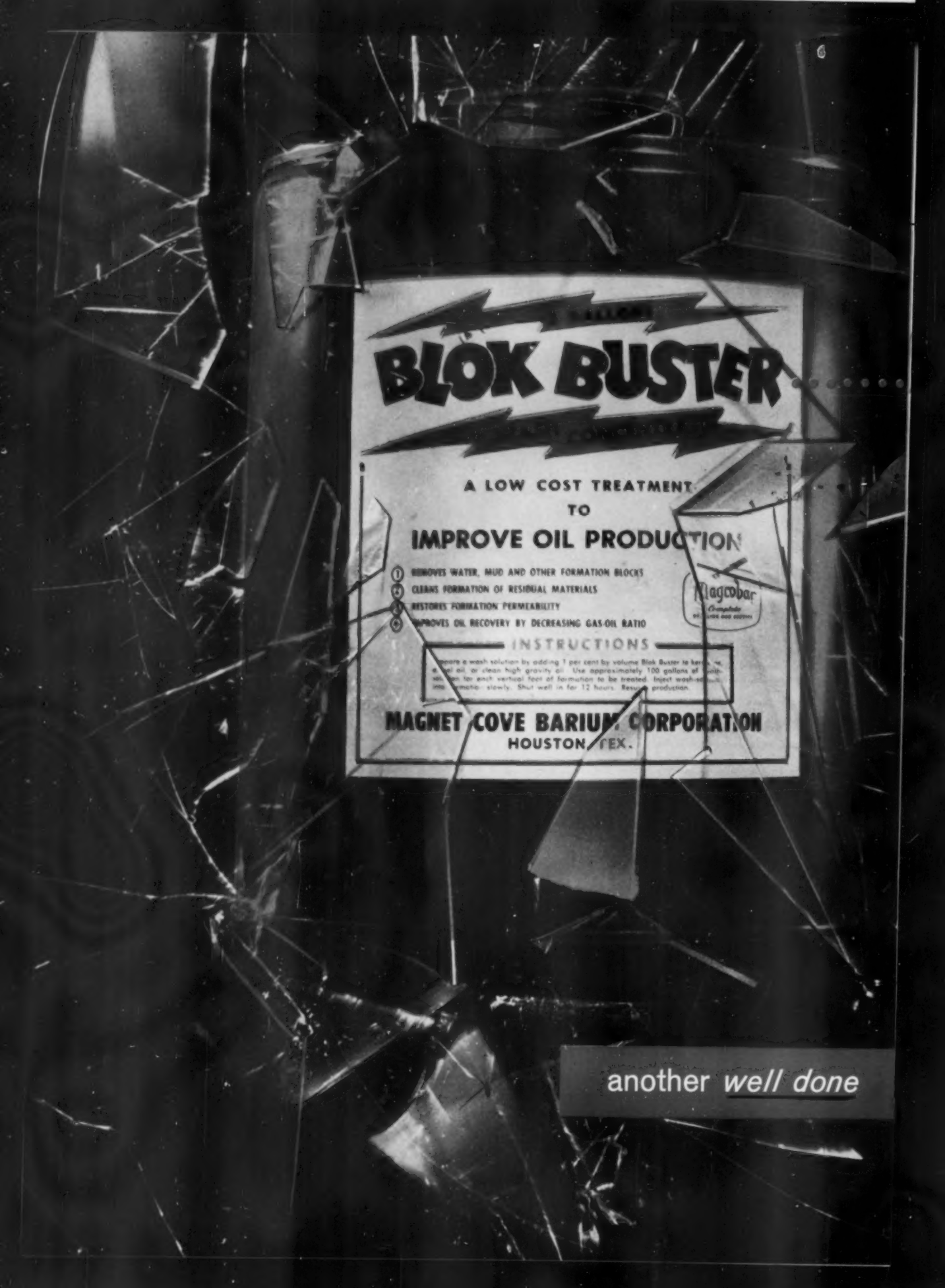
Proper safeguards are uppermost in importance in protecting tanks which contain gases and flammable liquids in the event of fire. For example, tanks must be guarded against extreme heat exposure. Leaking gas, if it should develop, must be diluted to the point where it will not burn. And fire, if it should occur, must be localized and controlled or extinguished.

With a Grinnell Water Spray System, you get protection against all these eventualities.

Before heat raises tank temperatures dangerously, an enveloping spray of water provides instant cooling, reducing internal pressure which helps prevent rupture. In addition, air turbulence is created (even in still air) which, in conjunction with the water vapor from the spray, helps dilute the flammable vapors controlling or extinguishing the fire. Flammable products which cannot be safely extinguished can be burned off under the protecting water spray with no damage to adjacent protected equipment.

There is a Grinnell Fire Protection System for every fire hazard. Call on Grinnell for advice about the one suited to your needs. Grinnell Company, Inc., 277 West Exchange Street, Providence 1, R. I.

GRINNELL FIRE PROTECTION SYSTEMS SINCE 1870


BLOK BUSTER
A LOW COST TREATMENT
TO
IMPROVE OIL PRODUCTION
1 REMOVES WATER, MUD AND OTHER FORMATION BLOCKS
2 CLEANS FORMATION OF RESIDUAL MATERIALS
3 RESTORES FORMATION PERMEABILITY
4 IMPROVES OIL RECOVERY BY DECREASING GAS-OIL RATIO
Magcobar
INSTRUCTIONS
MAGNET COVE BARIUM CORPORATION
HOUSTON, TEX.
another well done

breaks mud, water, and emulsion blocks to increase well production

Blok Buster increased production in these wells

Well did not produce as well as reservoir indicated	*Originally produced 10 BOPD from Dakota "J" sands. After a 10-gal. Blok Buster treatment, production was increased to 43 BOPD and is still pumping 36 BOPD five months later.*
Well did not resume normal production after workover	*Well producing 1 MMCF gas and 30 to 35 bbl. distillate per day from Frio was killed. Following workover, the distillate production was lost. After a 5-gal. Blok Buster treatment, production was increased to 1.5 MMCF and 11 to 14 bbl. distillate per day. Two months later this production is still holding.*
Well did not increase following hydraulic fracturing	*Well had average production of 5 BOPD and 20 bbl. water. Following fracturing operation, well produced exactly same. Using 35 gal. Blok Buster, production after 21 days was increased to 16 bbl. oil and 11 bbl. water per day.*

Blok Buster will open your pay-zones, too, to increased, long lasting production. Here's how it works: Powerful surface-tension reducing agents destroy water blocks in the pores of formations. Powerful dispersants in Blok Buster move clay particles and inorganic solids out of the formation into the well bore. All existing emulsions which might limit production are broken.

But even with this power, Blok Buster can't hurt your well. It won't form emulsions or change the wettability of reservoir rock. It's absolutely non-corrosive, won't damage tubing or well head, will not affect refining operations. Blok Buster is completely soluble in oil and will not form a sludge with reservoir hydrocarbons or water. Plus, Blok Buster is easy and economical to use. The average Blok Buster treatment is only 20-30 gallons — much less than the cost of workovers or acidizing.

Blok Buster is another example of the cost cutting products developed by Magcobar, proof that the right products *used right* on your wells can cut your costs. A Magcobar engineer can advise you on application techniques for your particular production problem. Blok Buster is available in 5-gallon cans from any of Magcobar's 500 stockpoints in the United States and Canada. Elsewhere, write Foreign Operations, P. O. Box 6504, Houston, Texas.

with Magcobar Technology

Magcobar
Complete
DRILLING MUD SERVICE

MAGNET COVE BARIUM CORPORATION

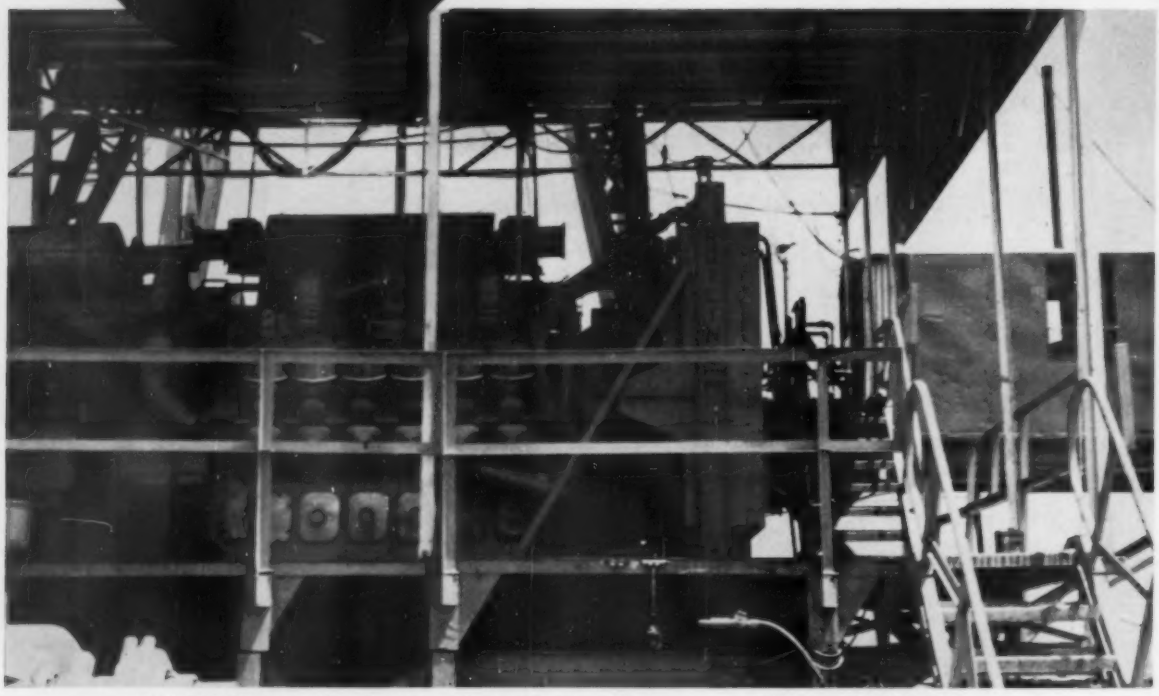
Houston

59-203

ROILINE ENGINES

(Formerly LE ROI)

for more power per fuel dollar



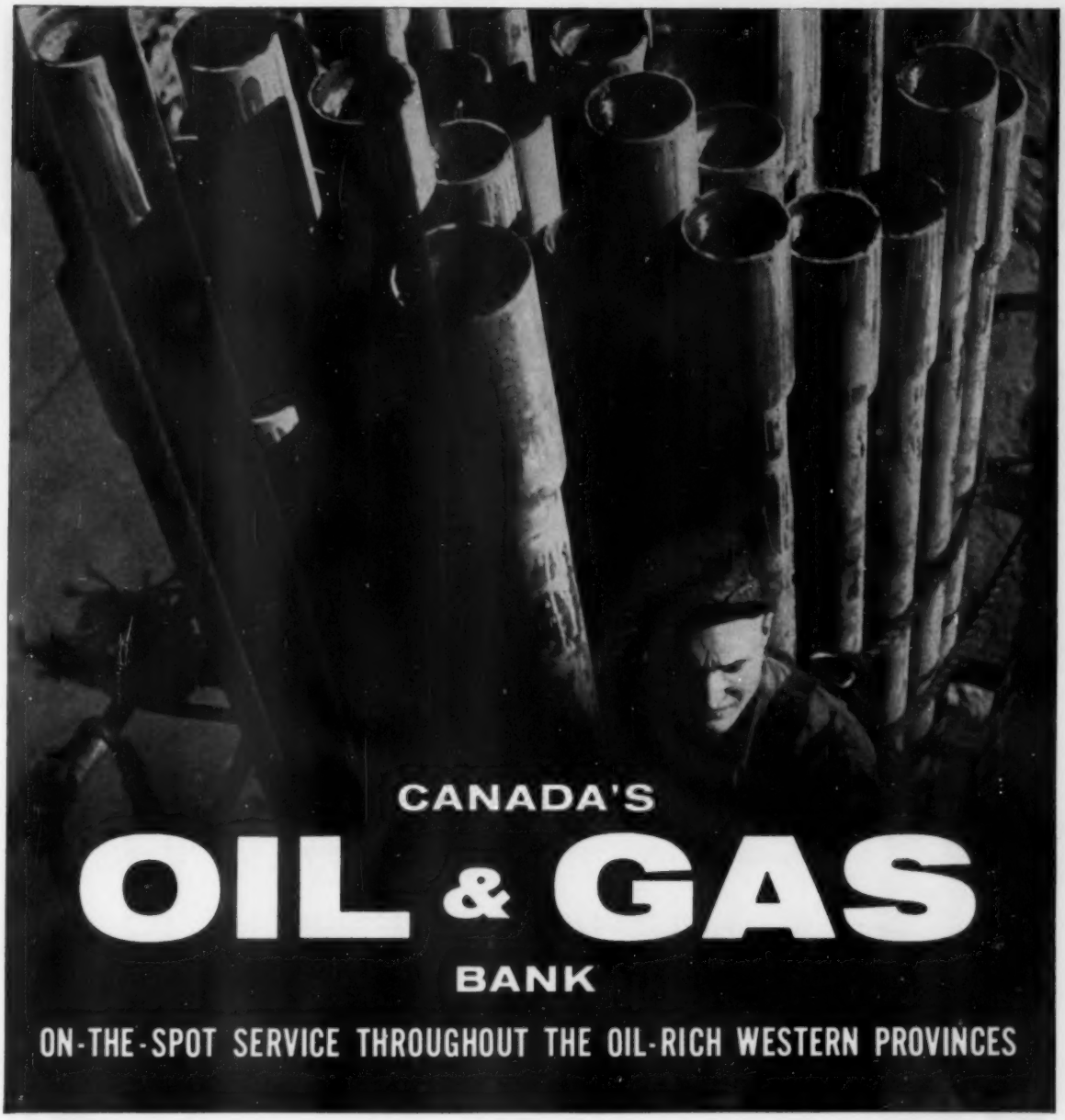
Shell Oil Company Rig No. 14 at Lovington, New Mexico—powered by three L-3460 Roiline gas engines—3468 cu. in. displ., V-12 cylinders, 7¼-in. bore x 7-in. stroke—each 570 max. hp. at 1350 rpm.

All-around dependability . . . with the high acceleration so important in drilling . . . is combined with high fuel economy, low upkeep and long service life in Model L-3460 ROILINE engines. It's largely a matter of design. Design that's basically simple . . . always modern, because it's constantly being improved to meet the oil fields' changing needs. Among the ROILINE advantages are full length guided valve stem mechanisms, light weight cam ground aluminum pistons, precision bearings, full flow oil filters, sectional water-cooled exhaust manifolds, large main bearings, full pressure lubrication, and other big features. For details send for Bulletin E-7A.

ARIZONA, Casa Grande, Engine Service Company, Inc.
ARKANSAS, Paragould, Wonder State Manufacturing Co.
CALIFORNIA, Long Beach, Engine & Equipment Company
COLORADO, Denver, Emrick & Hill Engine & Equipt. Co.
ILLINOIS, Centralia, John Nickell Company
KANSAS, Garden City, Carson Machine & Supply Co.
LOUISIANA, Shreveport, Ingersoll Corporation
MICHIGAN, Reed City, Hafer Engine Company
OHIO, Columbus 19, Cantwell Machinery Company
OKLAHOMA, Chickasha, Chickasha Gin & Mill Supplies
Oklahoma City 9, Carson Machine & Supply Co.
PENNSYLVANIA, Pittsburgh 34, P. C. McKenzie Company
TEXAS, Houston 1, Southern Engine & Pump Co.
Lubbock, Farmers Supply Company
Odessa, General Machine & Supply Co.
Wichita Falls, Nortex Engine & Equipment Co.
WYOMING, Casper, Emrick & Hill Engine & Equipt. Co.

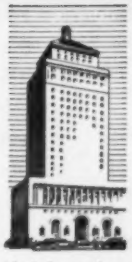
• *The trade mark LE ROI is used under license from Westinghouse Airbrake Co., the trade mark owner.* 427

WAUKESHA MOTOR COMPANY, WAUKESHA, WISCONSIN / **New York • Tulsa • Los Angeles**
Factories: Waukesha, Wisconsin and Clinton, Iowa



Canada's largest bank—the Royal—is in an exceptionally favorable position to provide complete banking services to oil and gas men.

Over 300 branches are strategically placed throughout the oil and gas rich areas of Western Canada, each offering on-the-spot facilities. In addition, an Oil and Gas Department in Calgary extends many valuable special services required



by oil and gas men. Small wonder that the Royal is known as Canada's "Oil and Gas Bank."

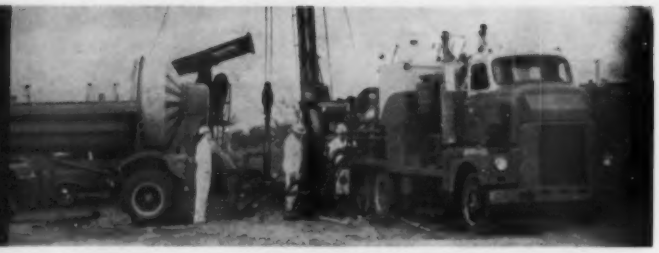
A list of current Oil and Gas bulletins covering regulations, tariffs, financing, statistics and kindred subjects pertaining to the Canadian industry is available on request. Write The Royal Bank of Canada, Oil and Gas Department, 409 Eighth Ave. W., Calgary, Alta.

We do not provide information on oil securities

THE ROYAL BANK OF CANADA

Head Office: Montreal
New York Agency—68 William Street, New York 5, N. Y.
Dallas Representative—H. E. McClenaghan, 1523 Republic Bank Bldg.
Over 900 branches in Canada, the Caribbean area and South America • Offices in New York, London and Paris • Correspondents the world over
Total Assets Exceed 4 Billion Dollars

MULTI-PURPOSE "RECOVERY" TEAM



HALLIBURTON *tools and service*

Good oil well cementing is not a matter of chance; it depends on several vital factors selected by the well owner: the right tools for correct placement ... cement slurries to match formation conditions ... and skilled cementers.

When Halliburton cements your well, Halliburton multi-purpose cementing tools, chemicals and service help to protect the potential producing zones for greater oil recovery. The result: more oil in your tanks ... more profit on your books.

That's why experience in cementing is so important. It's the key to all the factors that make up superior oil well cementing ... for better longest-lasting oil well protection. Put this multi-purpose "recovery" team to work for you on every job; specify Halliburton tools, products and services.

USE THESE HALLIBURTON PRODUCTS TO HELP GET THE MOST OUT OF YOUR WELL:

FORMATION PACKER SHOE:

Installed on the first joint of a string of casing, Halliburton's Formation Packer Shoe offers the greatest advantages. Used in all areas where conditions require casing to be set on top of the producing formation:

1. Helps protect low-pressure formations from cement contamination during cementing.

2. Floats in and guides casing to bottom.

3. Super-Seal Back-Pressure Valve keeps cement slurry from backing up inside the casing above the Formation Packer Shoe.

4. Provides circulation of fluids through end of Shoe until shoe packer rubber is expanded and set.

FULL-FLOW PACKER SHOE:

This Halliburton multi-purpose tool helps protect the formation below while cementing tubing or casing in new or old cased or uncased oil, gas or water injection wells. Particularly suitable for fracturing or treating of old wells after tubing or casing is cemented. No internal parts remain in the string to be drilled out upon completion of the cementing operation. Danger of drilling fluid damage is reduced.

HOWCO HYFLO:

An efficient emulsion breaker, effectively removes water blocks and emulsions from productive formation, permitting flow to the well bore with less resistance.

MCA:

Halliburton's effective Mud Cleanout Agent, the industry's most efficient mud dispersant, helps to clean out mud and soft filter cake in the annular area, reducing the possibility of cement channeling and providing better bonding of the cement to the formation.

ROTO WALL CLEANERS:

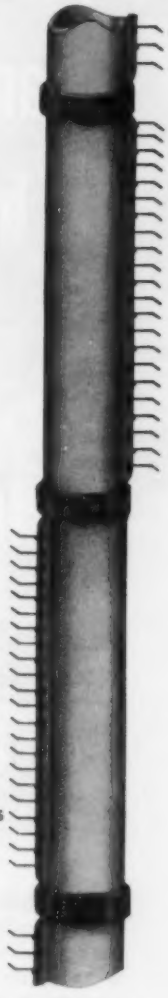
Removal of excess deposits of filter cake from bore hole is essential to make a better cement bond during primary cementing thus providing protection for casing, producing formations and minimizing remedial squeeze jobs. The Roto Wall Cleaner's high strength claw-type steel cleaning spikes give this maximum wall cleaning action and distributes cement better while rotating casing. Reduces bore hole damage while running in...offers less restriction to fluid flow while running casing, circulating or cementing...easy to install, economical to use.

Where welding is undesirable, the standard base is flat on each end and middle to permit installing the NEW Roto Wall Cleaner on 4½", 5½", 7" and 7⅝" O.D. size casing with Halliburton Vise-Lok Limit Clamps. Test proven under severe torque loads, the Vise-Lok Limit Clamp will hold the cleaner as securely stationary on casing as tack-welding.

CASING SWIVEL FOR FORMATION PACKER SHOE

CASING SWIVEL FOR FORMATION PACKER SHOE:

Permits rotation of casing with Roto Wall Cleaners and Casing Centralizers installed after the Formation Packer is fully expanded against wall of open hole. Swivel is installed above Packer Shoe on first joint; wall cleaners and centralizers above swivel. A thrust bearing in upper housing provides swivel action and is tested to exceed normal cementing pump pressures. Swivels are available for casing sizes 4½" through 8⅝".



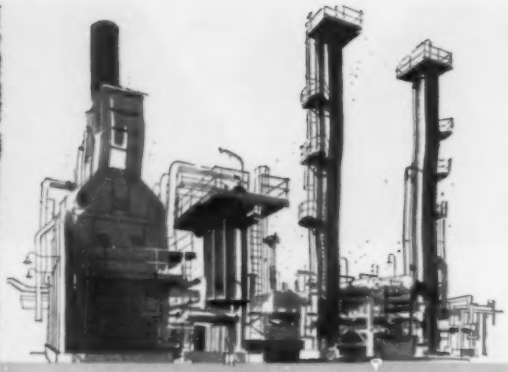
ROTO WALL CLEANERS INSTALLED WITH VISE-LOK LIMIT CLAMPS

HALLIBURTON CEMENTING SERVICES

HALLIBURTON OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA

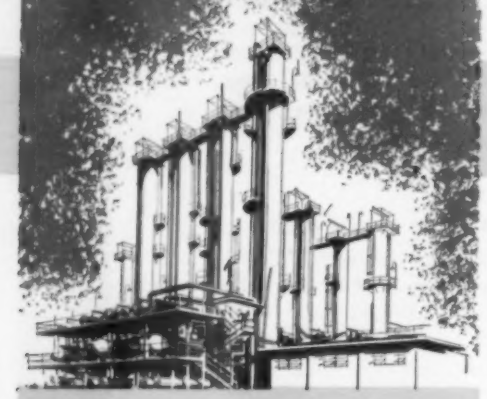
"A WELL WORTH CEMENTING IS WORTH CEMENTING WELL"

Now any refiner can process any crude he wants...



PLATFORMING® produces
high octane gasolines, high purity aromatics

HF ALKYLATION
makes alkylate, top anti-rumble motor fuel



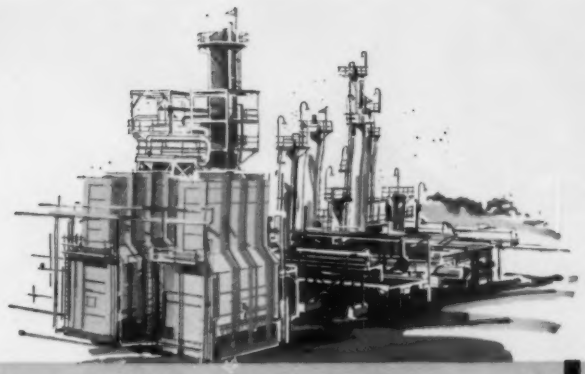
UDEX® the ideal process for
separation of super-purity aromatics

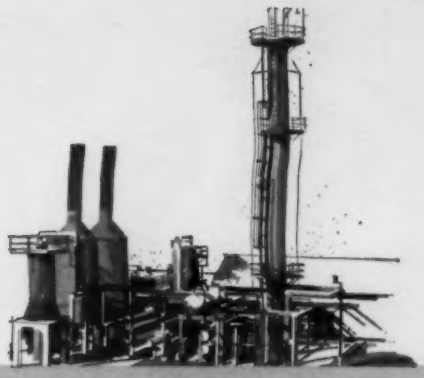
other

Never before could the petroleum refiner accomplish what he can today. Regardless of the sources and nature of his crude supply—or the kind of petroleum or petrochemical products he wishes to produce—Universal can furnish invaluable aid in helping achieve his objectives.

From its nineteen different processes currently available, Universal is in an unparalleled position to provide you with technical knowhow. From analysis of product and market potentials and evaluation of crude supplies through to process design, engineering, operator training and field and laboratory service, UOP is equipped and ready to work with you every step of the way.

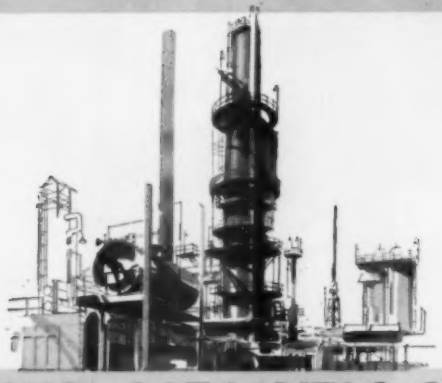
Write for information. Consultation is invited on any processing problem.

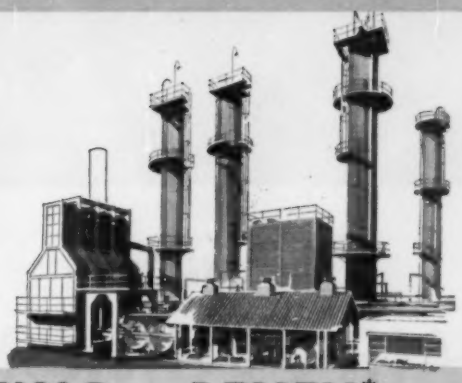




BUTAMER* a new and practical process for producing isobutane

UNIFINING* a modern process that completely purifies petroleum distillates





FLUID CATALYTIC CRACKING an improved process that gives higher yields, higher octane numbers

PENEX* new process converting light, normal paraffins to isoparaffins

processes available from UOP

REXFORMING®
the ideal process to insure your top octane position

UNISOL®
a safe and economical process for low-cost gasoline finishing

VACUUM DISTILLATION and VISBREAKING
simple, easy to operate processes for preparation of feed stocks for catalytic cracking

L.P. COKING
permits adjustment of gasoline-to-heavy oils production ratio to meet market needs

THERMAL CRACKING
two-coil selective process, handles wide range of charging stocks

CATALYTIC CONDENSATION
converts olefin fractions of refinery gas into high-quality gasoline and petrochemicals

OLEFIN EXTRACTION
efficiently separates olefins and diolefins from paraffins. Also prepares olefins for further conversion

CATALYTIC DEHYDROGENATION
removes hydrogen from hydrocarbons to produce less saturated hydrocarbons

HYDRAR*
converts benzene to cyclohexane with excellent yields. Extreme high purity achieved with Udex grade benzene

AROSORB
removes heavier aromatics from synthetic and natural distillates, produces aromatic-free heavier distillates

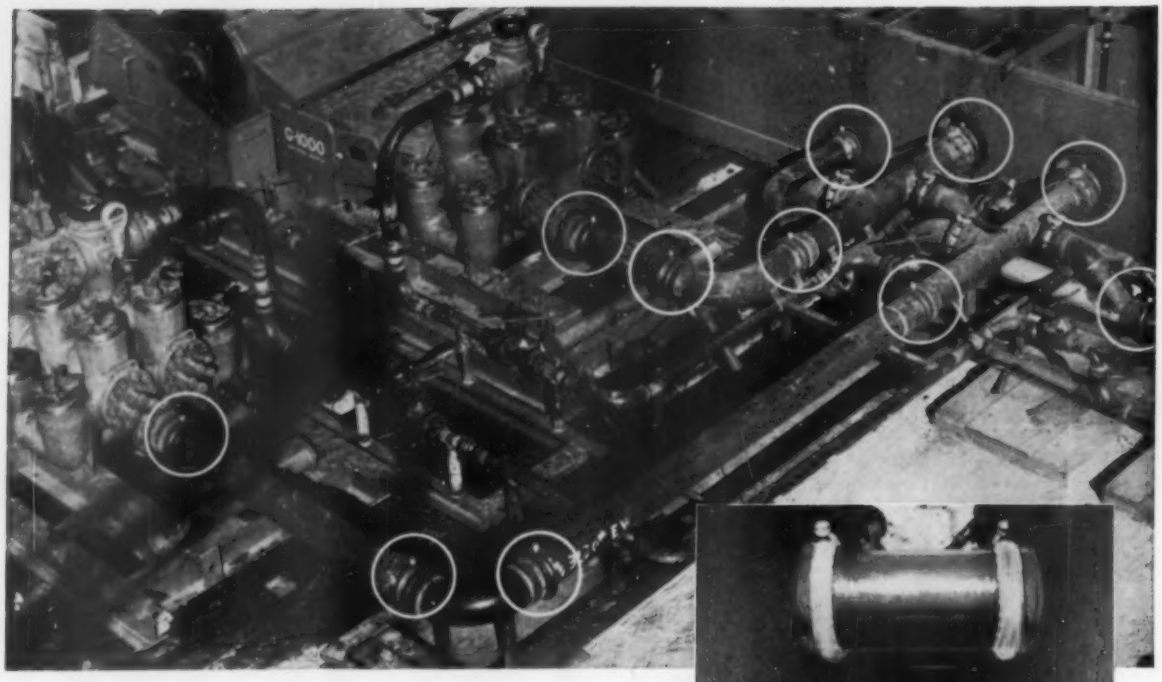
ALKAR*
produces ethylbenzene, cumene and other alkylated aromatics from Fluid Catalytic Cracker off-gas streams

SULFURIC ACID ALKYLATION
produces alkylate, blending component for high-octane gasoline

*TRADEMARKS

UNIVERSAL OIL PRODUCTS COMPANY
30 ALGONQUIN ROAD, DES PLAINES, ILLINOIS, U.S.A.

More Than Forty Years Of Leadership In Petroleum Refining Technology



The WECO AIR-O-UNION

PAT. PEND.

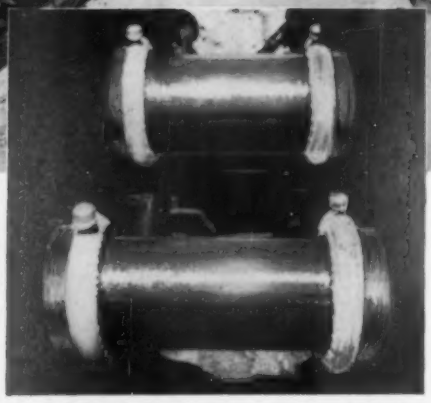
SEALS WITH A SHOT OF AIR

- **For Mud Suction and Return Lines**
- **For Low Pressure Fluid Lines**

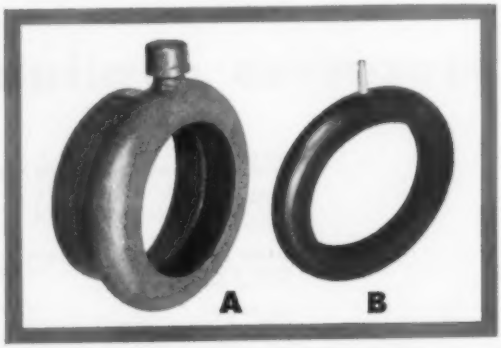
AIR-O-UNIONS, now manufactured by WECO, are available from WECO and Chiksan representatives and supply stores throughout the world.

Air sealed Air-O-Unions give you a perfect seal on low pressure lines . . . make up fast and easy without close line-up . . . allow pipe expansion and mis-alignment without breaking the seal. No bolts, nuts, wrenches required . . . no threading or grooving is necessary . . . just use plain end pipe. Jab it through the union, inflate the tube and they're made up ready for service. To break out, just deflate the tube.

For efficient, low cost mud suction, mud return and other low pressure lines, install WECO Air-O-Unions. Ask your WECO Representative or your supply store.



AIR-O-UNIONS on mud tanks and suction lines save hours of rig-up time. All you do is slip the pipe in place, inflate the tube and your suction lines are ready for service. (Inset) Installation of Air-O-Unions for compounding mud tanks.



AIR-O-UNIONS consist of only two parts, the union body (A) which is permanently welded in place, and the inflatable tube (B). Only replacement ever required is the tube. Sizes range from 6" to 16".

Switch to low cost, timesaving, simplified Air-O-Unions for all low pressure lines.

WECO

WELL EQUIPMENT MFG. CORP.
HOUSTON, TEXAS

Division of CHIKSAN COMPANY *a subsidiary of* FOOD MACHINERY AND CHEMICAL CORPORATION

fmc

AO-2-59

Sure Signs of QUALITY

Under the famous sign of Republic Supply . . . The Flying "R", are sure signs of quality: Republic Steel, Rockwell-Nordstrom and Ladish. These are only three of the hundreds of quality names represented by Republic Supply.

The Flying "R" assures you of quality in service, plus the added convenience of store locations in every section of the oil and gas country.

When quality is important . . . it's important to order through Republic Supply!

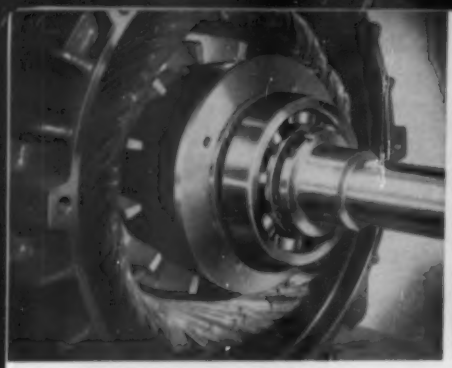
REPUBLIC STEEL
Seamless and Electric Weld Casing and Tubing, Seamless and Electric Weld Line Pipe, Continuous Weld Pipe, X-Tru Coat and Plastic Pipe.

ROCKWELL MANUFACTURING COMPANY
Rockwell-Nordstrom Plug Valves, Meters and Regulators.

LADISH COMPANY
Seamless Welding and Forged Steel Fittings and Flanges.

Republic Supply COMPANY

General Offices Oklahoma City, Oklahoma



HEAVY DUTY BALL BEARINGS... The ball bearings used in these motors are of the highest quality, with more than ample capacity to provide long trouble-free service under heavy loads.

BEARINGS CAN BE RELUBRICATED... Original factory lubrication will last for years in normal service—but convenient grease plugs are provided to permit relubrication that adds to motor life under severe conditions.

SECURELY SEALED FOR LOW MAINTENANCE... Both ends of these motors have running shaft seals to keep the bearings clean. Bearing housings are effectively sealed to prevent escape of grease.

Wagner Totally Enclosed Motors

Designed to give you Extra Protection

PROTECTED AGAINST CORROSIVE... ABRASIVE AND EXPLOSIVE ELEMENTS

WM59-7

Here are motors that will deliver full-rated horsepower under the toughest service conditions—that will help you keep your production rates up, and give you the kind of dependable, continuous operation that is so important to automation.

Type EP Motors are fully protected against damage from corrosion, dust, abrasives, fumes, steel chips or filings. Type JP is explosion proof as well—is designed and approved for use in explosive atmospheres.

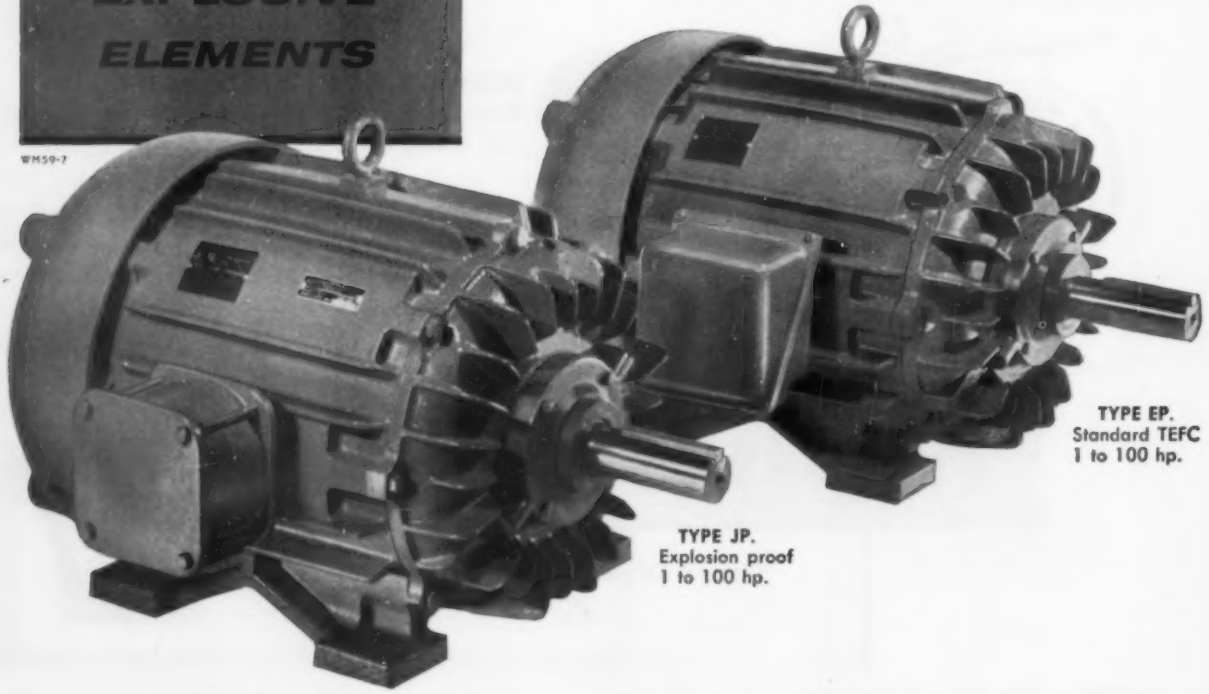
Integral ratings, 1 through 100 horsepower, are built in the latest NEMA frames, 182 through 445 US, with ribs that add mechanical strength and increase the surface cooling area.

Let your Wagner Sales Engineer show you how these protected motors can bring you savings on initial motor costs, maintenance costs, and in continuity of operation.

Branches and Distributors in All Principal Cities

Wagner Electric Corporation

6389 Plymouth Ave. • St. Louis 14, Missouri

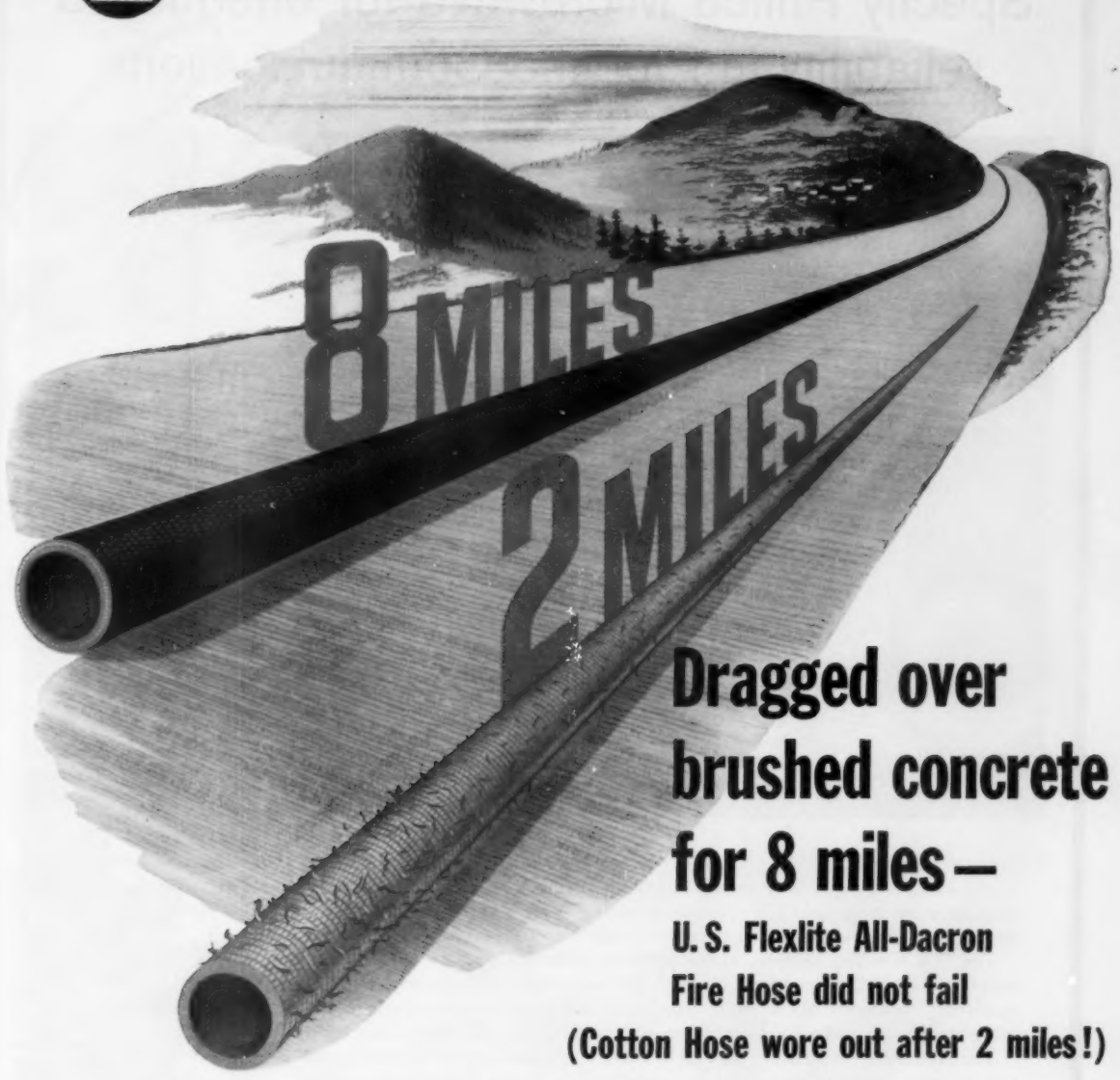


TYPE EP.
Standard TEFC
1 to 100 hp.

TYPE JP.
Explosion proof
1 to 100 hp.

OTHER FRAME SIZES AVAILABLE IN RATINGS THROUGH 500 HP.

FLEXLITE ALL-DACRON FIRE HOSE



Dragged over brushed concrete for 8 miles—

U. S. Flexlite All-Dacron Fire Hose did not fail

(Cotton Hose wore out after 2 miles!)

This test convincingly proves the overwhelming ruggedness of Flexlite® Hose. It demonstrates, too, that a hose can be rugged and at the same time light and *flexible*. Flexlite's lightness enables fire crews to fight fire without being hampered by excess weight.

U.S. Flexlite Hose brings you these other advantages: It won't absorb water and hence can't freeze. It is highly resistant to oils and chemicals. Every foot is subjected to five hundred pounds test pressure before leaving the factory.

This hose comes in any color for ready identification as a fire hose. This prevents its being carried off or utilized for purposes other than fire fighting.

• • •

When you think of rubber, think of your "U.S." Distributor. He's your best on-the-spot source of technical aid, quick delivery and quality industrial rubber products.

Mechanical Goods Division

United States Rubber

WORLD'S LARGEST MANUFACTURER OF INDUSTRIAL RUBBER PRODUCTS

Rockefeller Center, New York 20, N.Y. In Canada: Dominion Rubber Company, Ltd.

Specify Philco Microwave for unequalled reliability in Pipeline Communications

Featuring the revolutionary CLR-9 duplex terminal, with wideband composite signal, Philco Microwave Systems insure highly dependable, unattended, point-to-point communications for voice, telemetering, VHF maintenance and inter-site voice . . . plus high speed data transmission and supervisory control.

The CLR-9, which operates in the 6000 mc to 8000 mc bands, consists of a highly stable, FM, reflex klystron transmitter and a low-noise superheterodyne receiver. Continuous operation is assured by the automatic switching to the integrated standby which is kept in continuous operation with the primary unit.

The unitized construction of the CLR-9 provides the utmost in flexibility and ease of maintenance through plug-in printed wiring chassis. In addition, metering and test circuits are built in and centrally located on the control panel.

For reliable, economical, maintenance-free microwave communications . . . specify Philco. *Government and Industrial Division, 4700 Wissahickon Avenue, Philadelphia 44, Pennsylvania. In Canada: Philco Corporation of Canada Limited, Don Mills, Ontario.*

- Plug-in Printed Wiring Chassis
- Expandable—Wide Bandwidth Suitable for Computer Control and Data Transmission
- Convection Cooled Klystrons—No Blowers
- Built-in Metering and Test Circuits—in a Single Test Panel
- Compatible with all Multiplex Equipment
- 240 Voice Channels

PLUG-IN PRINTED WIRING CHASSIS —are replaced quickly, providing utmost ease of maintenance; printed wiring panels give increased circuit stability.

PHILCO QUALITY FIRST!

News! The best features of
modern bearing design combined and refined in

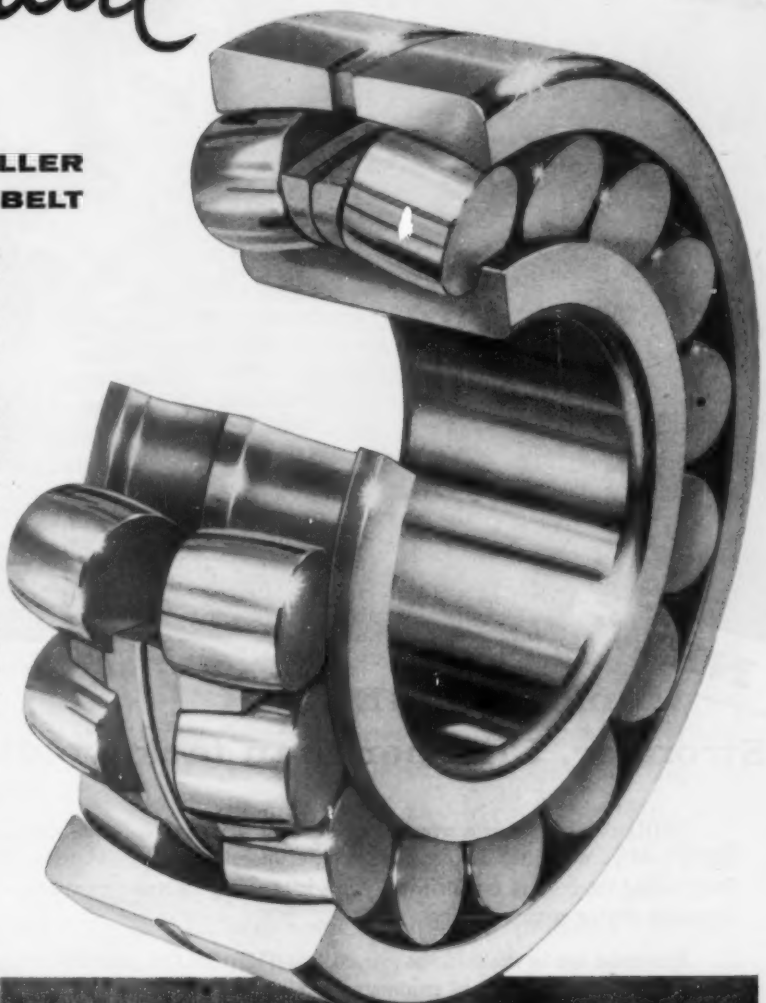
Spherical

SELF-ALIGNING ROLLER BEARINGS BY LINK-BELT

BIG, mirror-smooth convex rollers *plus* heavy, broad-shouldered inner race *plus* centrifugally-cast bronze, precision-machined retainers! Only from Link-Belt do you get ALL that is best in modern bearing design.

Individually, these elements represent major improvements on accepted design concepts. Collectively, they constitute the most efficient spherical roller bearings available . . . promise unequalled economies, whatever the application.

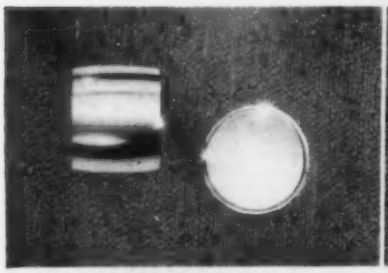
Your Link-Belt office or authorized stock-carrying distributor will gladly explain the many performance advantages evolved with this new design. And either can furnish full data on industry's most complete line of ball and roller bearings . . . pillow blocks and flanged, flanged-cartridge, cartridge and take-up blocks.



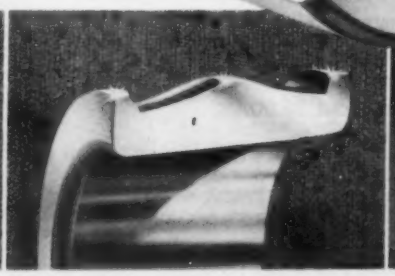
LINK-BELT

MANUFACTURERS OF SELF-ALIGNING BALL AND ROLLER BEARINGS

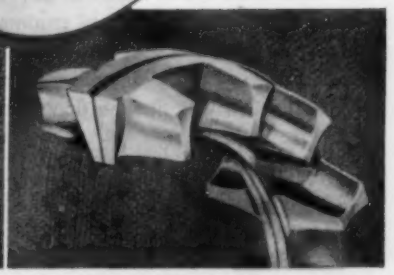
LINK-BELT COMPANY: Indianapolis 6, Houston 1, Dallas 26, Odessa, Tex., New Orleans 16, Shreveport, La., Los Angeles 22 (Montebello), Scarboro (Toronto 13); Export Office, New York 7. Distributors in All Fields. 14,810-B



BIG, HIGHEST-CAPACITY ROLLERS. Each bearing has a maximum number of rollers—as large as possible, yet all components are in optimum balance.



HIGH, HEAVY INNER RACE FLANGES present convenient hold for assembly and removal of bearing without cutting away shaft, avoid any need to skimp on shaft shoulders.



PRECISION-MACHINED, CENTRIFUGALLY-CAST BRONZE RETAINERS have many times more support and ability to withstand high stress. They are not stampings. Design assures maximum bearing efficiency.

NEW!

Humble THREDLOK

Stronger, Cheaper than tack-welding

THREDLOK 801 is a new compound that seals and locks casing joints tightly and permanently. It offers an easy, economical alternative to welding for bonding the bottom two or three joints in a casing string to prevent casing breakout during rotary drilling.

Extensive use in the field has proved that THREDLOK provides stronger joints than tack-welding. It eliminates the possibility of damage to high-strength casing that may result from welding alloy pipe. And where welding the first two or three joints in a casing string costs approximately $50 to $75, THREDLOK gets the job done for about $6.00.

THREDLOK 801 is available in pound cans, @ $3.00 per lb., at Humble wholesale plants throughout Texas and New Mexico. THREDLOK is also available through many oil field supply stores. Call the one nearest you, or phone or write:

Humble Oil & Refining Company
Consumer Sales, P. O. Box 2180
Houston 1, Texas

How to use

- Remove couplings, carefully clean and dry both male and female threads.
- Mix contents of THREDLOK can, pour converter into can and stir thoroughly.
- Apply THREDLOK to male and female threads with paddle or putty knife, making sure the threads are completely covered.
- Make the joint up immediately. It can then be run into the hole without delay.

HUMBLE

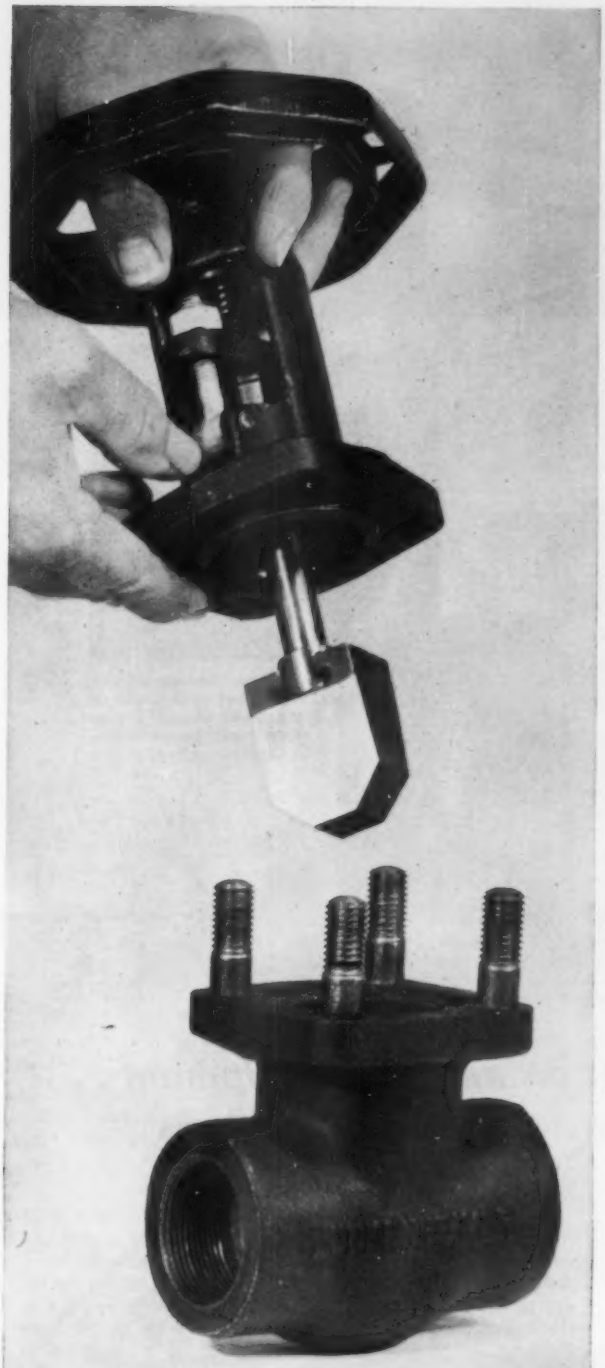


Fig. 8001 Screwed Ends. Sizes ½" to 2"
Fig. 8002 Socket Welding Ends

A New Lunkenheimer Valve

CHECK THE FEATURES OF THIS LUNKENHEIMER FORGED STEEL GATE VALVE

This new Lunkenheimer Forged Steel Gate Valve is already building a reputation for rugged service. Completely new in design, it's compactly built for fast installation in the most cramped quarters. Produced with famous Lunkenheimer materials and highly-skilled workmanship, it handles pressures of 800 lbs. at 850°F., and 2000 lbs. at 100°F. easily and safely. Discs are 13 Chrome Stainless Steel, heat treated completely through to 500 Brinell hardness to eliminate chipping or cracking. Rolled-in Seat Rings can't work loose. This newest addition to the world-famous Lunkenheimer line can help solve *your* valve maintenance problems. Call your Lunkenheimer Distributor, or write us for literature. The Lunkenheimer Company, Cincinnati 14, Ohio.

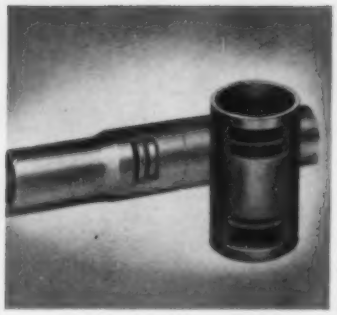
BRONZE • IRON • STEEL • PVC

L-1057-4

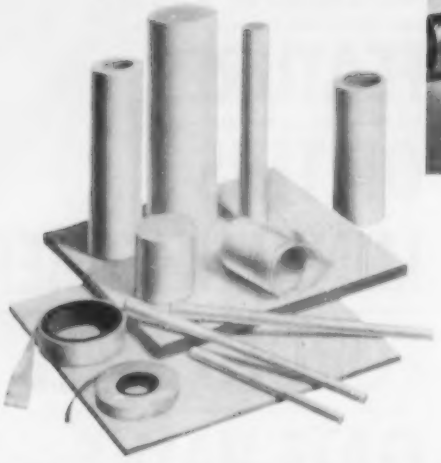
LUNKENHEIMER QUALITY

LUNKENHEIMER®

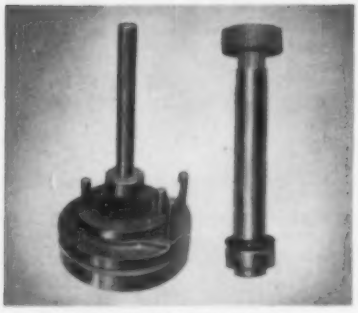
THE ONE *Great* NAME IN VALVES



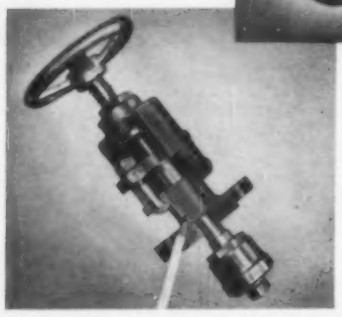
RING SEALS of Du Pont TFE resins resist acids and high temperatures . . . also prevent leakage at pipe joints in wells developing high pressures.



BEARING SEALS of TFE resins help meter crude oil accurately with minimum maintenance. Parts like these can be made from rod or tube.



CLUTCH FACING (left) and relief valve poppet head of TEFLON TFE-fluorocarbon resins installed in an oil-pump regulator are still good after 5 years and millions of cycles.



PACKING for petrochemical valve operates efficiently because of the natural lubricity of TEFLON TFE-fluorocarbon resins plus their outstanding resistance to heat and corrosives.

Cut maintenance costs of oil and gas equipment . . .

stock standard shapes of TEFLON TFE-fluorocarbon resins

Out in the field or in the plant, a stock of standard shapes of TFE resins can prove to be invaluable. Make durable repair parts quickly and easily by fabricating them from standard shapes. You can maintain your equipment in top shape and save money by cutting downtime and leakage losses.

Du Pont TFE-fluorocarbon resins are not affected by chemicals encountered in gas or petroleum processing. Their extreme resistance to corrosives remains unchanged, even at high temperatures; TFE resins are rated for continuous use at 500°F. They have outstanding sealing properties, so that you can cut excellent seals, gaskets or packings from your standard shapes. They provide extremely low coefficient of friction—make "self-lubricating" bearings and sliding surfaces from them. TFE resins are ideal electrical insulating materials and offer new opportunities for cost savings in maintenance and process engineering as a result of their anti-stick properties.

See your local supplier of Du Pont TFE resins for a good selection of standard shapes, and start saving on repairs and downtime. For our new booklet "*How to Use Sheets, Rods, Tubes, Tape and Other Standard Shapes of* TEFLON", write today to your supplier or to: E. I. du Pont de Nemours & Co. (Inc.), Polychemicals Department, Room T-30420, Du Pont Building, Wilmington 98, Delaware.

• • •

In Canada: *Du Pont of Canada Limited, P.O. Box 660, Montreal, Quebec.*

Unlike many other non-metallic materials, articles of TEFLON *TFE resins can be ordered against meaningful specifications to insure your receiving a standard product. Your supplier, who fabricates TFE resins, is prepared to furnish you with stock shapes in the best combination of sizes and the best combination of properties.*

DU PONT
REG. U. S. PAT. OFF.

TEFLON®
TFE-FLUOROCARBON RESINS

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

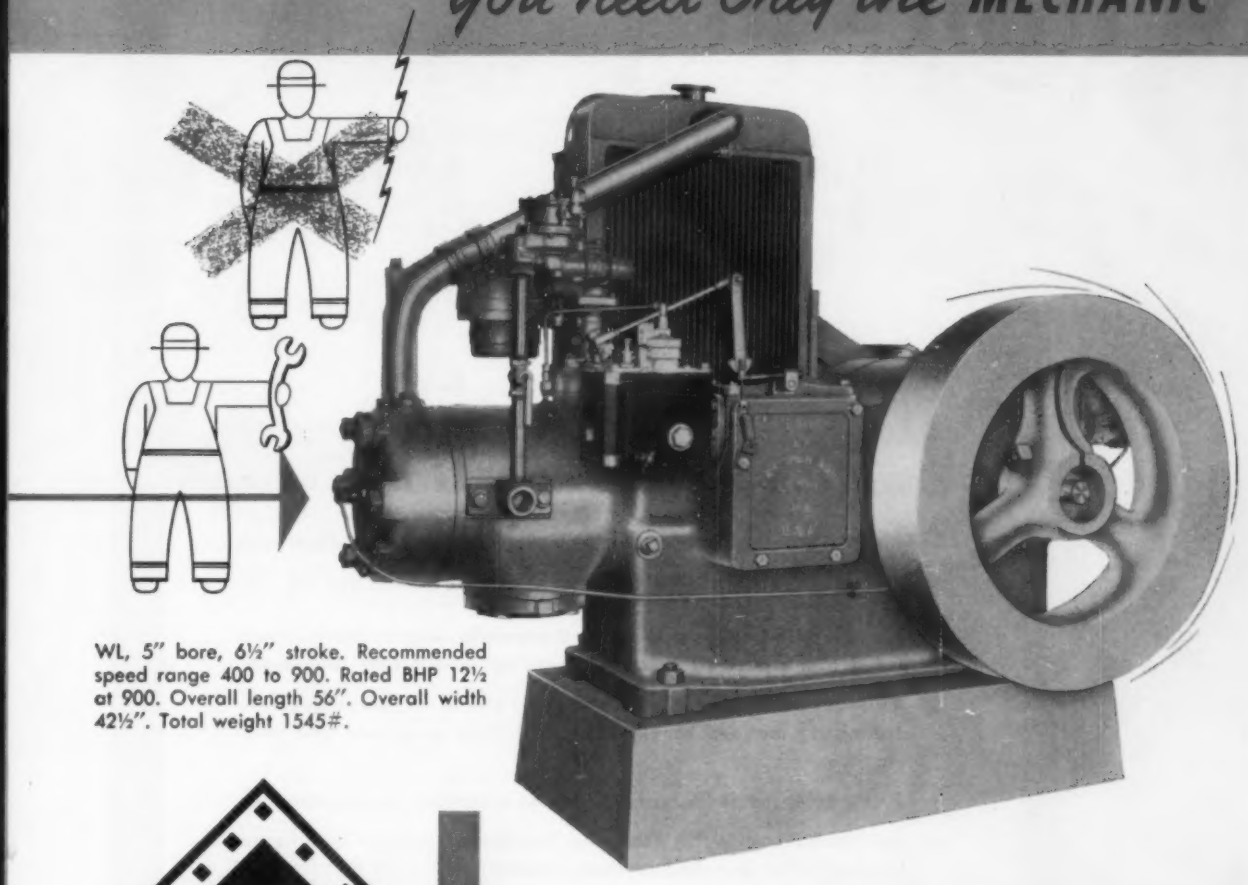
TEFLON *is Du Pont's registered trademark for its fluorocarbon resins including the TFE (tetrafluoroethylene) resins discussed herein.*

Why two men to do one man's job?

with Electrified Equipment { 1-ELECTRICIAN / 2-MECHANIC

with **AJAX GAS ENGINE**

You need Only the MECHANIC

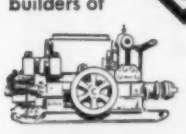


WL, 5" bore, 6½" stroke. Recommended speed range 400 to 900. Rated BHP 12½ at 900. Overall length 56". Overall width 42½". Total weight 1545#.

AJAX ENGINES

AJAX GAS AND OIL ENGINES

AJAX also builders of



Compressors

Pressure Pumps

AJAX IRON WORKS CORRY, PENNSYLVANIA

OIL FIELD DISTRIBUTORS

- The National Supply Company, Pittsburgh, Pa.
- R. B. Moore Company, Bolivar, N. Y.
- Bethlehem Steel Company — Supply Division, Tulsa, Okla.

See our exhibit at International Petroleum Exposition, May 14-23, Tulsa, Oklahoma with The National Supply Co., and Bethlehem Steel Co., Supply Division.

Here's your invitation to the

GREATEST SHOW IN OIL...

LOOK FOR THE
GOLDEN DERRICKMAN
Mid-Continent
WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY
YOU'RE INVITED . . .
Greatest Show in Oil . . . Biggest Display of Oil Field Equipment

Be sure and see these Mid-Continent exhibit features at the International Petroleum Exposition — May 14-23:

- ★ **The new Mid-Continent U-712-A Drawworks with features illuminated and described by tape-recording in different languages.**
- ★ **A 60-foot Golden Derrickman will guide you to an operating power drilling rig manned by experienced drilling personnel and making hole.**
- ★ **A new color movie featuring Kendavis Industries' export activities.**
- ★ **An international pylon featuring translating services in different languages for our visitors from abroad.**
- ★ **Hundreds of new and improved products conveniently displayed by the industry's leading manufacturers.**

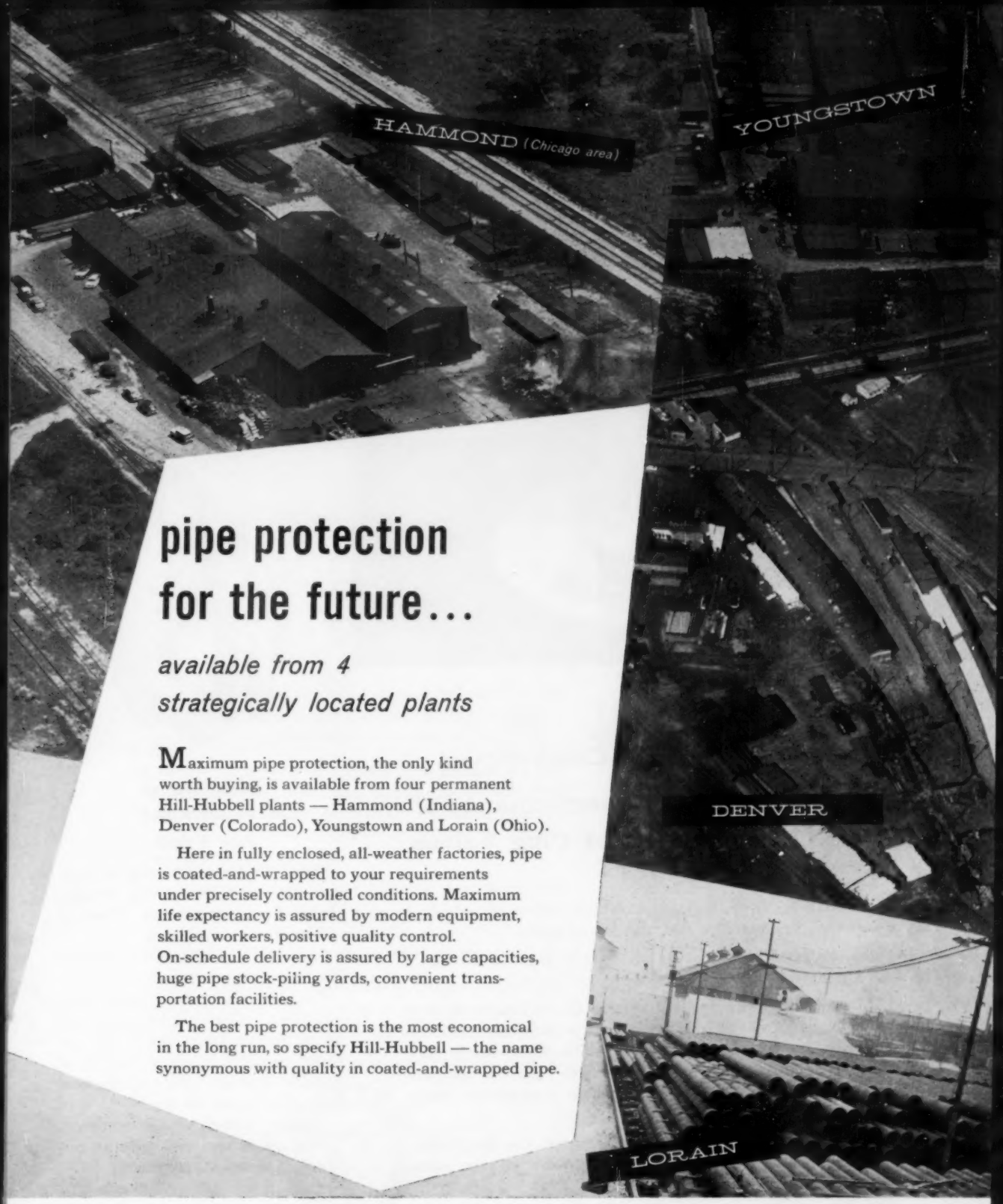
MCS-9

MID-CONTINENT SUPPLY CO.

MID-CONTINENT BUILDING • FORT WORTH, TEXAS
Export Division: 45 Rockefeller Plaza, New York 20, N. Y. Cable: MIDCUMPORT NYK

A KENDAVIS INDUSTRY

THE WORLD'S LARGEST INDEPENDENT OIL FIELD SUPPLY COMPANY



pipe protection for the future...

available from 4 strategically located plants

Maximum pipe protection, the only kind worth buying, is available from four permanent Hill-Hubbell plants — Hammond (Indiana), Denver (Colorado), Youngstown and Lorain (Ohio).

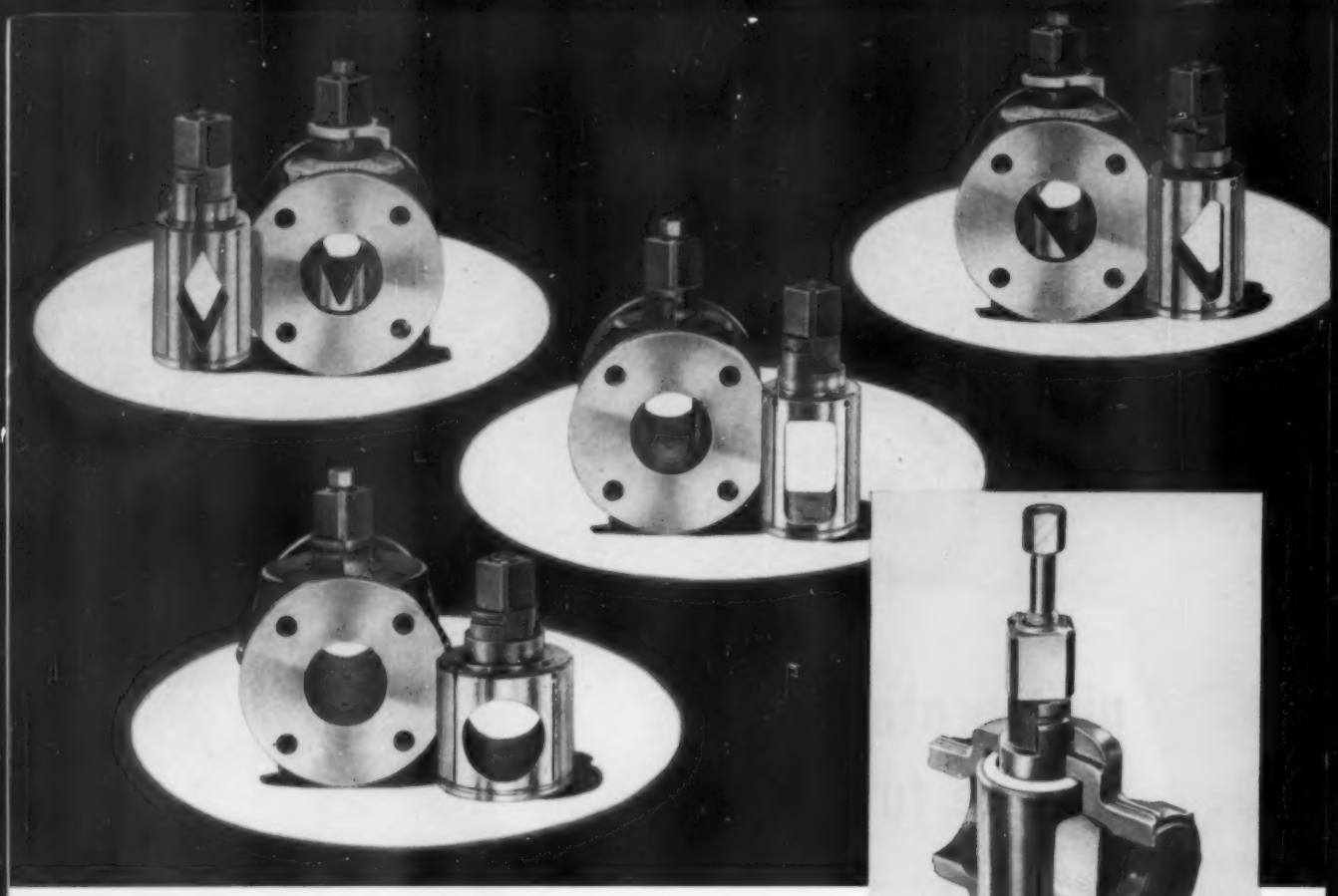
Here in fully enclosed, all-weather factories, pipe is coated-and-wrapped to your requirements under precisely controlled conditions. Maximum life expectancy is assured by modern equipment, skilled workers, positive quality control. On-schedule delivery is assured by large capacities, huge pipe stock-piling yards, convenient transportation facilities.

The best pipe protection is the most economical in the long run, so specify Hill-Hubbell — the name synonymous with quality in coated-and-wrapped pipe.

Specify Hill-Hubbell wrapped pipe on your next job . . .

HILL·HUBBELL

HILL-HUBBELL & CO. • 3091 MAYFIELD RD. • CLEVELAND 18, OHIO



W-K-M's *Creative Engineering*

assures the dependable performance of W-K-M's acf Lubricated Plug Valves

Lubricated plug valves are the work-horse valves of industry. They're versatile, they're economical, they're readily available.

But one lubricated plug valve is not "just as good as another!" The ACF Cylindrical Plug Valve has many advantages.

W-K-M's creative engineering has designed the ACF valve to give you longer life, greater efficiency, minimum maintenance. W-K-M production pays constant attention to the manufacturing details that spell the difference between a "pretty good valve" and the best you can use. W-K-M tests every ACF valve against requirements much beyond the use for which it is rated.

In short, W-K-M's creative engineering assures you *dependable performance* from every ACF Lubricated Plug Valve in your plant.

Advantages of acf® Lubricated Plug Valves

These versatile valves have full pipe area openings. They provide through-conduit flow with minimum turbulence and minimum pressure drop.

They can be installed in any position. They can be serviced quickly.

They are safe against rupture while lubricating—excess lubricant escapes visibly to the atmosphere around the neck of the plug; this eliminates build-up of lubricant pressure, prevents lubricant from escaping into the line.

Lubricant protects against corrosion.

Available in semi-steel, Ni-resist, carbon steel, bronze and aluminum.

WRITE FOR CATALOG 400

VISIT W-K-M IPE TULSA · MAY 14-23

W-K-M

DIVISION OF acf INDUSTRIES
INCORPORATED
P. O. BOX 2117, HOUSTON, TEXAS
Export Office: 45 ROCKEFELLER PLAZA, NEW YORK, N.Y.

5029

Gasoline Plant . . .

Built With An Eye To The Future!

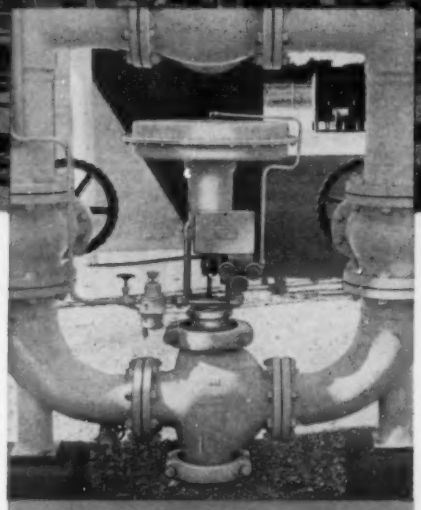
This modern absorption-type gasoline plant*, like most modern plants of today, was built with an eye to the future . . . with later expansion in mind.

Currently stripping 100 MMSCF of natural gas per day of propane, iso-butane, normal butane and natural gasoline, it can be quickly and inexpensively expanded to handle an additional 50% of its present capacity.

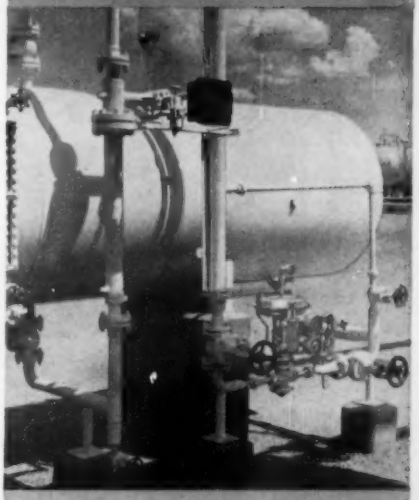
One very important reason for this plant flexibility was the incorporation in its design of wide range and capacity controls, such as BS&B Super 70 Control Valves, Liquid Level Controls and Regulators.

BS&B Controls are everywhere proving themselves in many different oilfield and other applications the world over. Why not specify them on your next job!

* Name and location supplied on request.



This 6", 150 lb. Super 70 serves as an accumulator pressure control valve. It is equipped with a direct acting actuator and valve positioner.



Butane splitter reboiler equipped with a BS&B Type 71-06 Series 2 Liquid Level Controller with automatic reset relay and a 1" Super 70 valve.

SUPER BS&B 70

BLACK, SIVALLS & BRYSON, INC.

Controls Division, Dept. 4-A4

7500 East 12th Street Kansas City 26, Missouri

To refiners who need more

HYDROGEN
FOR HYDROTREATING

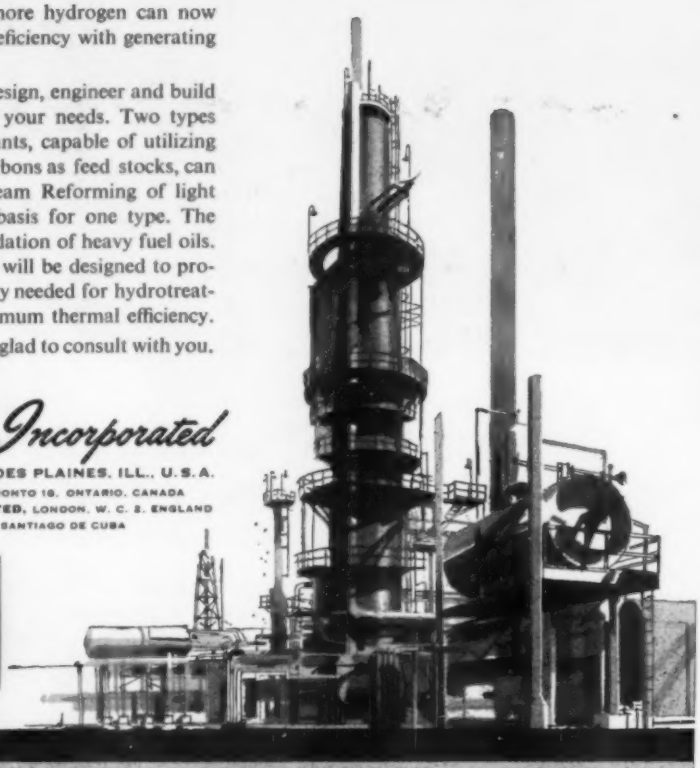
Any refiner who needs more hydrogen can now arrange to make up the deficiency with generating facilities of his own.

Procon is prepared to design, engineer and build a hydrogen plant to suit your needs. Two types of packaged hydrogen plants, capable of utilizing a broad range of hydrocarbons as feed stocks, can be supplied. Catalytic Steam Reforming of light hydrocarbons forms the basis for one type. The other employs Partial Oxidation of heavy fuel oils. With either type, the plant will be designed to produce hydrogen of the purity needed for hydrotreating—and to provide maximum thermal efficiency.

Procon engineers will be glad to consult with you.

PROCON *Incorporated*

1111 MT. PROSPECT ROAD, DES PLAINES, ILL., U.S.A.
PROCON (CANADA) LIMITED, TORONTO 18, ONTARIO, CANADA
PROCON (GREAT BRITAIN) LIMITED, LONDON, W. C. 2, ENGLAND
PROCON INTERNATIONAL S. A., SANTIAGO DE CUBA



plants available from **PROCON***

PROCESSES AVAILABLE TO SUIT ANY REFINERY FEED STOCK

*Service includes process design, engineering and construction

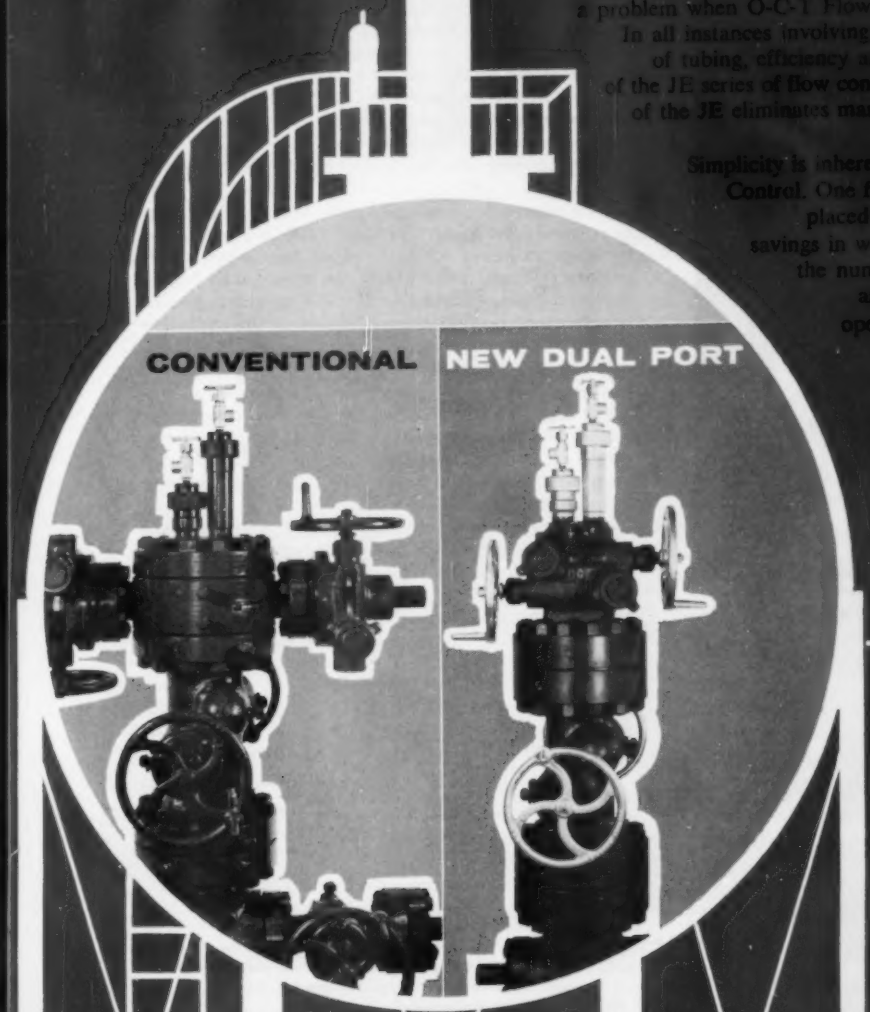
WORLD-WIDE CONSTRUCTION FOR THE PETROLEUM, PETROCHEMICAL AND CHEMICAL INDUSTRIES

FLOW CONTROL MASTERY

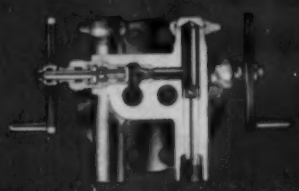
Efficiency, economy for any type of completion

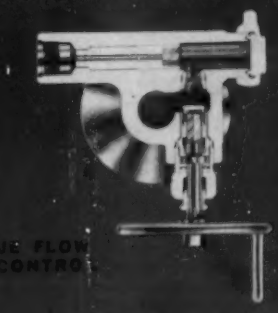
There is no type of completion that poses a problem when O-C-T Flow Control Units are used. In all instances involving completions with a single string of tubing, efficiency and economy are assured through use of the JE series of flow controls. The integral one-piece casting of the JE eliminates many fittings and connections.

Simplicity is inherent in the O-C-T Dual Port Flow Control. One flow control is integrally placed above another, thereby effecting savings in weight and reducing the number of crosses, wing valves and choke assemblies. Leak-proof operation thus is gained.



DUAL PORT FLOW CONTROL





JE FLOW CONTROL

where progress is a daily practice

O·C·T

OIL CENTER TOOL CO.

SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

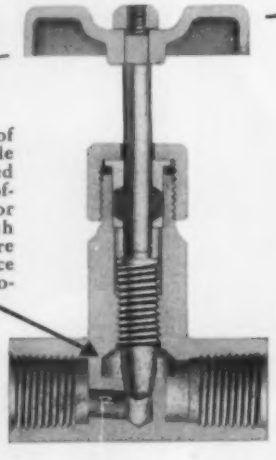
Address Export Inquiries for All Countries to P. O. Box 3091, Houston, Texas

MAXIMUM WORKING PRESSURE
10,000 PSI
for water, oil or gas

- Body and stem guide extra heavy bar stock fused into one piece.
- Valve stem 416 stainless steel.
- Packing special one-piece "Marpak" moulded ring.
- Bodies marked in accordance with MSS regulations.

ONE PIECE

The stem guides of conventional needle valves are screwed into bodies—this often causes leakage or blow-outs. Marsh Needle Valves are fused into one-piece by exclusive "Conoweld" process.



The Ultimate in Needle Valves

Here is one of the crowning achievements of Marsh research, design, and manufacturing skill. It is the first needle throttling and shutoff valve to combine *all* of the qualities called for today in this highly critical and ever broadening field.

It is a valve that has strength and safety to spare . . . rated for pressures up to 10,000 psi—equally efficient in the lower ranges. A product of Marsh instrument-making and valve manufacturing experience, it combines instrument-like precision with the ruggedness that distinguishes all Marsh valve specialties.

The illustrations tell the story of new thinking; new standards. Body and stem-guide are machined from extra-heavy carbon steel bar stock. Still greater strength and rigidity are achieved by fusing the stem-guide into the body. The complete fusion of guide and body is accomplished by the exclusive Marsh "Conoweld" process.

There are two big advantages to this one-piece construction: (1) It eliminates the danger of unscrewing the valve from the body when opening—a frequent cause of leakage, even dangerous blow-outs (2) It permits perfect line-up of threads and seat. As a result, Marsh valves are easier to operate even at high pressures.

The precision-machined stem is 416 stainless steel. Stem threads are fine pitch for extra strength and fine, controlled regulation. Notable advancements are special "Marpak" one-piece, non-binding longer-lasting packing; deep thread chambers, keeping inlet and outlet piping away from ports and contributing excellent flow characteristics. Entire packing nut and packing gland are electro-zinc plated, preventing corrosion and giving the valve a handsome, plated exterior. The rugged malleable handle is finished in heavy baked enamel.

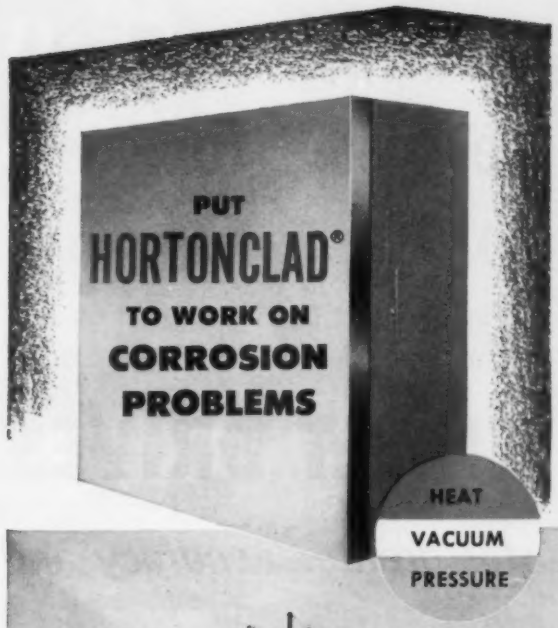
The new needle valve line includes globe and angle patterns with double female connections in sizes ⅛", ¼", ⅜", ½", ¾" and 1". Also globe and angle valves with male inlet and female outlet in sizes ¼" and ½". *Complete stock carried at our Skokie, Illinois factory and also at our branch plant in Houston, Texas.*

Write today for catalog giving complete details.

MARSH INSTRUMENT CO. *Sales Affiliate of Jas. P. Marsh Corporation*
Dept. L, Skokie, Ill. • Marsh Instrument & Valve Co. (Canada) Ltd., 8407 103rd St., Edmonton, Alberta • Houston Branch Plant: 1121 Rothwell St., Sect. 15, Houston, Texas

MARSH

"THE STANDARD OF ACCURACY"



High-Strength Bonded Clad Material Described in New CB&I Bulletin

Hortonclad is a corrosion-resistant composite metal having an integral and continuous bond of exceptionally high strength produced by a special high-vacuum bonding process. Available only in CB&I-fabricated tanks, pressure vessels and other clad structures, Hortonclad provides uniform thickness because cladding and backing plate are both in their final thickness prior to bonding.

The Hortonclad process employs silver, stainless steels (both chromium and nickel) nickel and alloys such as Monel, Inconel, Hastelloys B and F and a variety of other metals and alloys.

Write our nearest office for a copy of the CB&I bulletin which describes these benefits of HORTONCLAD:

- UNIFORM THICKNESS
- HIGH STRENGTH BOND
- CLEAN, CONTAMINANT-FREE SURFACE
- ADAPTABILITY TO ANY SIZE OR SHAPE

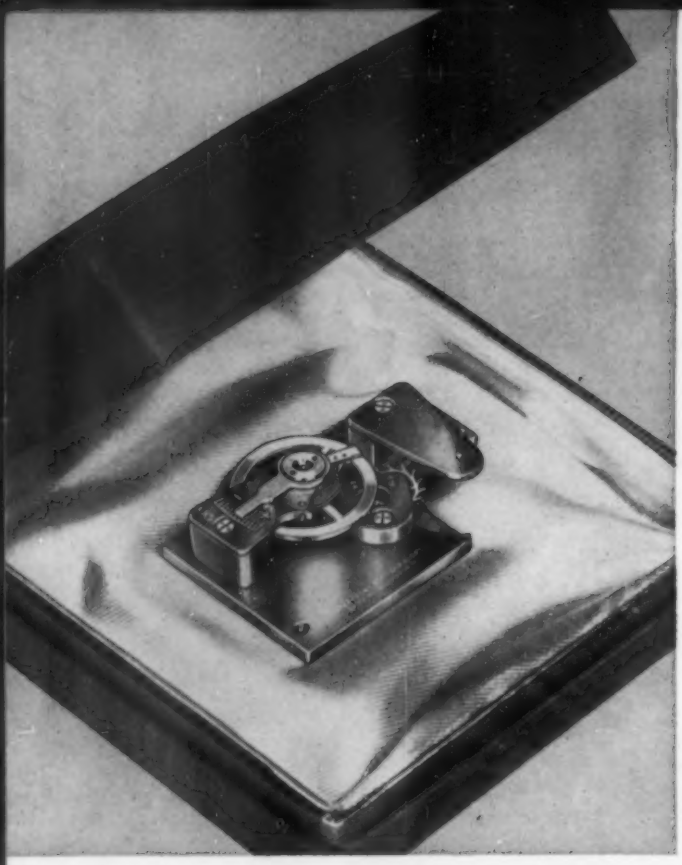
Two crude columns (left) and vacuum column (right) were partially clad using Monel Hortonclad and stainless steel. Crude columns are 174-ft. high. Vacuum column is 28-ft. in dia. at widest point and 125-ft. high.

P71-C

Chicago Bridge & Iron Company

Atlanta • Birmingham • Boston • Chicago • Cleveland • Detroit • Houston • Kansas City (Mo.)
New Orleans • New York • Philadelphia • Pittsburgh • Salt Lake City
San Francisco • Seattle • South Pasadena • Tulsa
Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, GREENVILLE, PA. and at NEW CASTLE, DELAWARE.
In Canada: HORTON STEEL WORKS LTD., TORONTO, ONTARIO
REPRESENTATIVES AND LICENSEES:
Australia, Cuba, England, France, Germany, Italy, Japan, Netherlands, Scotland
SUBSIDIARIES:
Horton Steel Works Limited, Toronto; Chicago Bridge & Iron Company Ltd., Caracas; Chicago Bridge Limited, London; Sociedade Chibridge de Construcoes Ltda., Rio de Janeiro

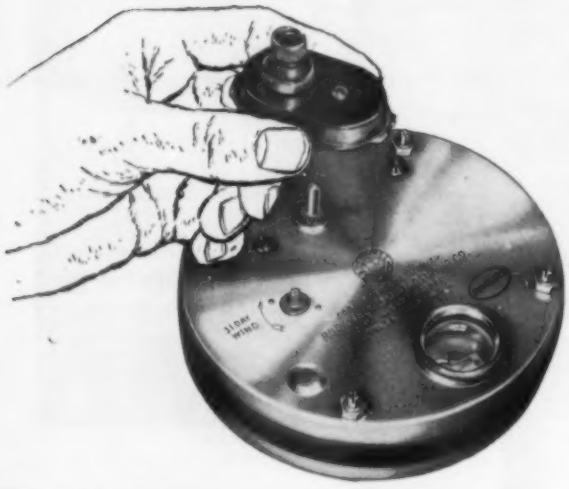
CB&I



Now there's a New "Jeweled" Escapement in ROCKWELL CHART DRIVES

for greater accuracy and longer life

This jeweled movement brings fine watch quality to instrument timing



SPEED CHANGING TURRETS PROVIDE SEVEN DIFFERENT ROTATION RATES

The basic Rockwell Chart Drive has a main arbor rotation rate of 7 days. Economical snap-on turrets permit changing to 8-day, 15-day, 16-day, 24-day, 30-day, 31-day, and 24-hour rotation. No tools or special skills are required. You can even change chart rotation without removing the drive from the instrument.

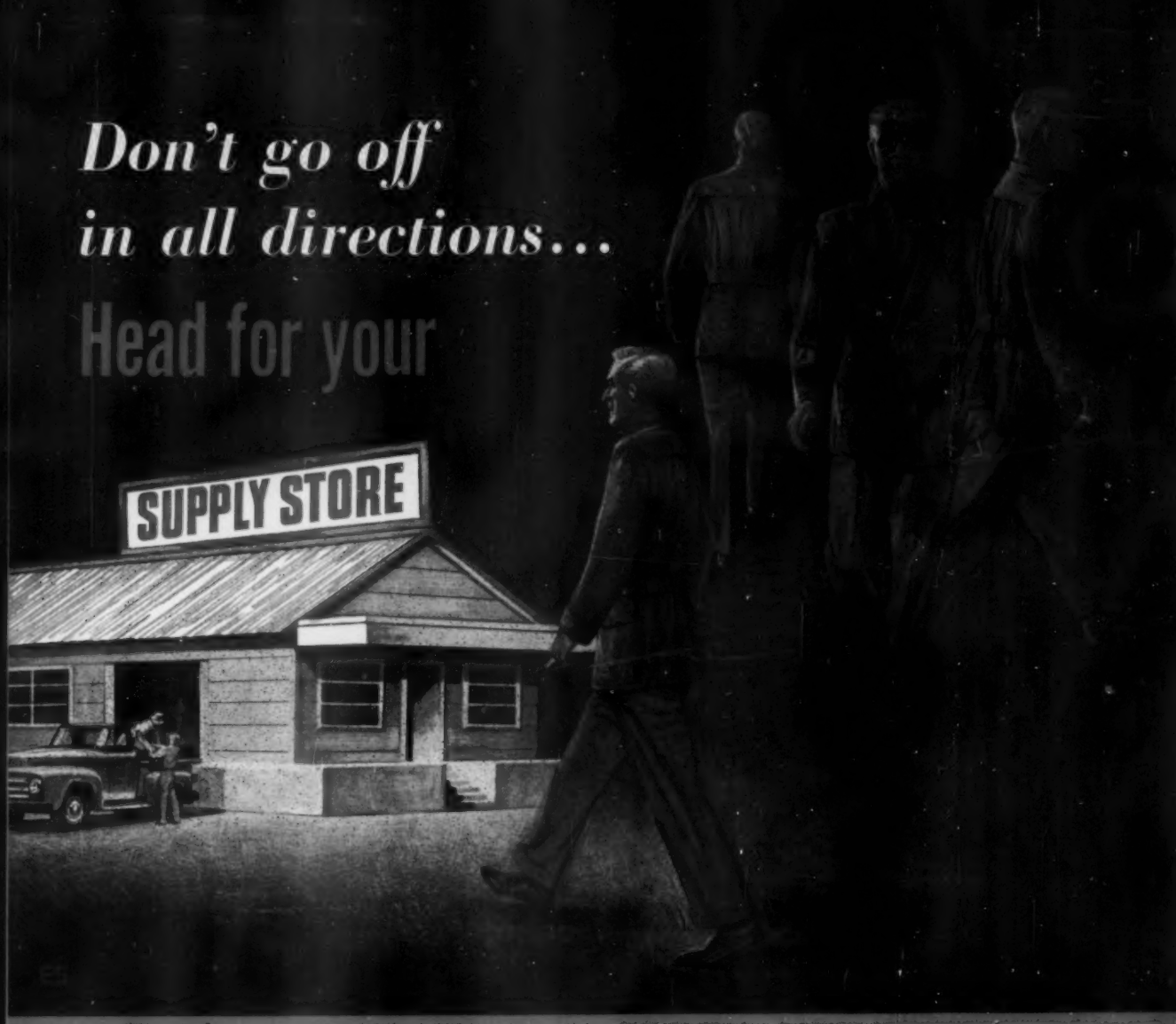
The introduction of a jeweled movement—the first ever used on a general industrial timing device made in the United States—makes the Rockwell more accurate than any unjeweled chart drive could possibly be. In addition to offering fine watch quality, the jeweled escapement requires less power to operate and is extremely durable, since seven hard jewel surfaces are provided to limit friction and wear.

You will benefit in many ways by using these jeweled movement chart drives for powering all your recording instruments. They adapt readily to fit into practically any instrument case while speed-changing turrets (see left) permit changing rotation rates at will. Write for full information. Rockwell Manufacturing Company, Instrument Division, Pittsburgh 8, Pa.

JEWELED CHART DRIVES

another fine product by

ROCKWELL



. . . it's stocked with the equipment you need for your immediate and long range drilling and production needs. The convenience of the SUPPLY STORE, the specialized knowledge of its personnel, and their conscientious service combine to save you many hours and many dollars on your well.

Among the wide variety of equipment available, you will find quality Baash-Ross slips, rotary bushings, safety clamps, spiders and other Baash-Ross drilling and production equipment. For convenience in buying —*there's no need to go off in all directions.* Just head for your SUPPLY STORE.

BAASH-ROSS DIVISION

OF JOY MANUFACTURING COMPANY

GENERAL OFFICES: 5306 CLINTON DRIVE, HOUSTON, TEXAS

AREA OFFICES:

Houston, Texas, Odessa, Texas, Dallas, Texas; Long Beach, Cal.; Casper, Wyoming; Oklahoma City, Okla.; Olney, Ill.; Calgary, Alberta, Canada; New York, N. Y. (Export Office)

FOREIGN OFFICES:

Monte Carlo, Monaco; Mexico City, Mexico; Greenock, Scotland; London, England; Paris, France; Caracas, Venezuela; Buenos Aires, Argentina; Rio de Janeiro, Brazil; Tokyo, Japan

BAASH ROSS JOY

CONTINENTAL-EMSCO *Presents*

Expanded Facilities

TO MEET THE WORLD'S GROWING DEMAND FOR C-E DRILLING AND PRODUCTION EQUIPMENT

C-E's fully integrated plants provide a new concept of quality manufacturing

Continental-Emsco's confidence in the future of the oil and gas industries is confirmed. Rapid development of overseas oil fields, increasing worldwide demand and new uses for oil, foretell a challenging 10-year period ahead. Anticipating this surge of growth, we have doubled the size of our Houston, Texas plant . . expanded our space at Garland, Texas . . moved our world headquarters into larger Dallas quarters. Physical enlargement is only a part of our story. Our Houston plant is unique in the oil and gas industries in that all *managerial responsibility* is concentrated *at the plant*. Centralizing management, engineering, design, quality control, manufacturing and testing in one location assures the operator using C-E equipment the finest in dependability, efficiency and long life. Manufacturers with scattered managerial responsibility cannot equal this fully integrated quality manufacturing concept. Now and in the future you will find C-E attuned to the oil and gas industries . . producing equipment that pays off with superior performance.

SEE OUR EXHIBIT

MAY 14-22, 1959
Tulsa, Oklahoma

DALLAS, TEXAS

From these new quarters, the Mercantile-Continental Building, C-E directs 132 stores and offices in the U. S. and Canada and representatives in over 30 countries throughout the world.

HOUSTON, TEXAS

This is the world's most complete oil field equipment plant. The manufacturing area under roof is 336,505 sq. ft. Drilling rigs, masts, blocks, swivels, rotary tables, slush pumps and unit pumpers are manufactured in this fully integrated plant with a total ground area of 77.2 acres. Outstanding structural and galvanizing facilities are also available at C-E's Houston plant.

GARLAND, TEXAS

The home of world famous D+B subsurface pumps, Continental sucker rods, couplings and swivel joints.

For Service that Sings..Equipment that Hums..Go..

CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide

CONTINENTAL-EMSCO COMPANY
A Division of The Youngstown Sheet and Tube Company
General Offices: Dallas, Texas
Export Division: 30 Rockefeller Plaza, New York, N. Y.
Continental-Emsco Company Limited
General Offices: Calgary, Alberta, Canada
Continental-Emsco Company C. A., Caracas, Venezuela
Plants: Houston and Garland, Texas,
St. Albans, Herts., England
Representatives in All Principal Oil Fields of the World

PA 901

Here's the reason
REPUBLIC ROTARY HOSE
does not develop knots

EQUAL TENSION ON EACH CABLE

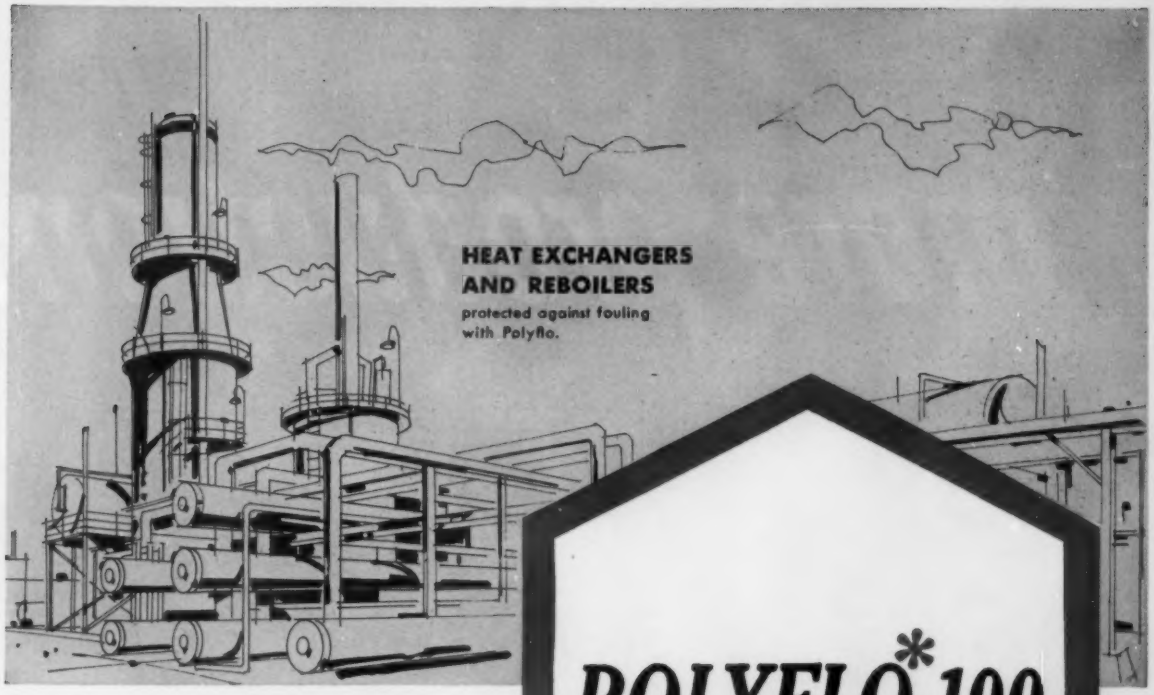
Only Republic Rubber can make Rotary Hose this way. The machine, shown here, applies all cable wires at the same time. It was designed and built in our own factory. These cables have the same tension so that pressure all along the hose will be equalized and knots or ridges cannot develop. The hose has the additional advantages of flexibility and crush resistance. Users have been generous in their praise for this hose as "the best Rotary Hose made". Stocked by J & L Supply Stores.

SUPPLY STORES STOCK THIS AND OTHER REPUBLIC HOSE

REPUBLIC RUBBER DIVISION

LEE RUBBER & TIRE CORPORATION, YOUNGSTOWN 1, OHIO

INDUSTRIAL RUBBER PRODUCTS



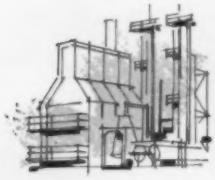
NOW... POLYFLO* 100

1 Multi-purpose Inhibitor-dispersant solves 5 pressing problems

A highly convenient all-around inhibitor-dispersant, UOP Polyflo 100 is also an effective stabilizer against thermal changes, color deterioration, sludge and deposit formation.

An effective dispersant for distillate, residual and crude oils, Polyflo 100 also eliminates fouling and sludge formation in heat exchangers and storage tanks.

Polyflo is but one of a variety of inhibitors and additives developed by UOP for petroleum refiners. Write our Products Department for detailed information on these products. Ask also about the services of our staff of treating field engineers, who will gladly work with you to solve specific problems.



No. 2 HEATING OIL
stabilized against color deterioration and sludge deposition.

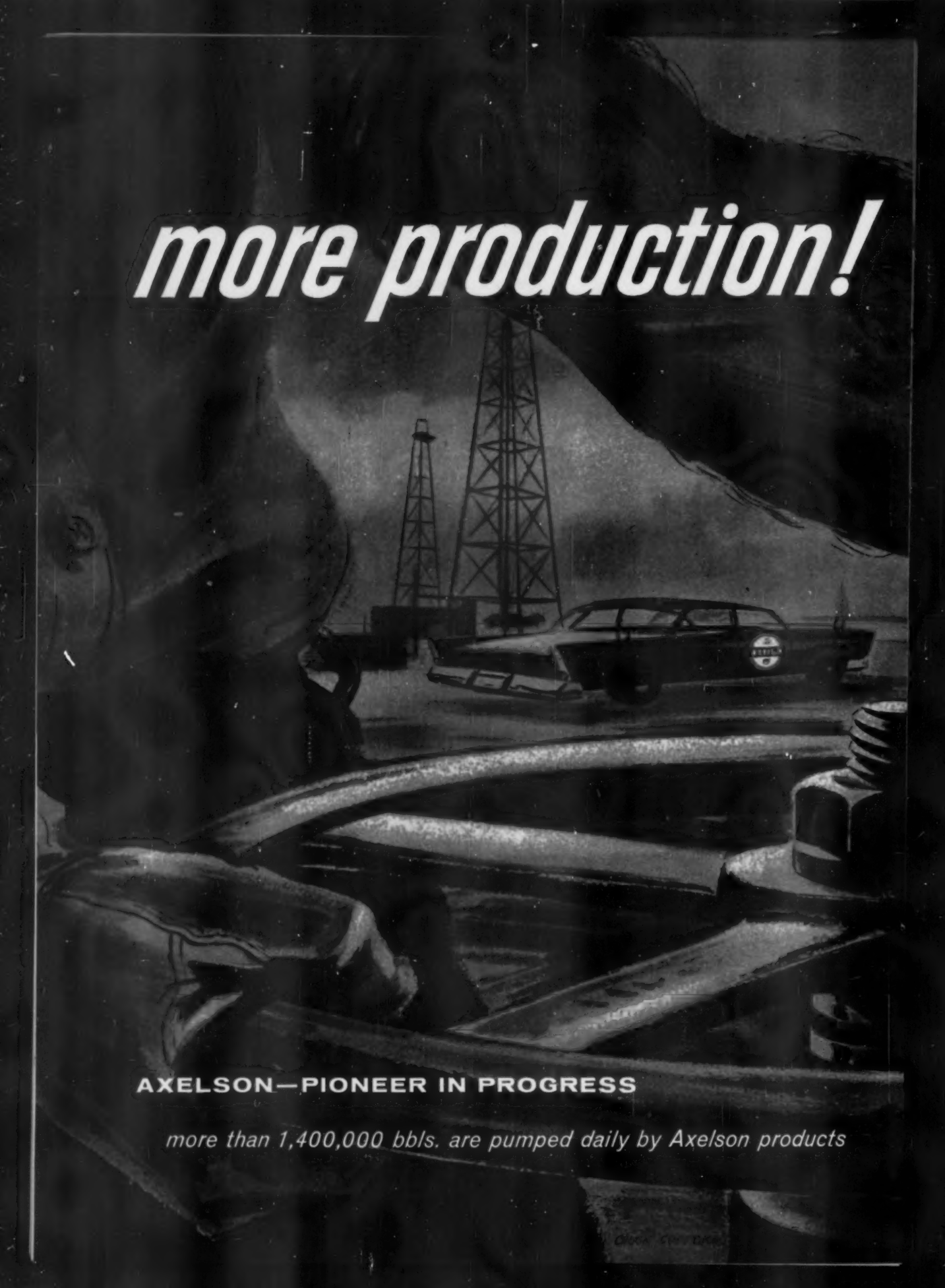
DIESEL FUELS
also effectively stabilized with Polyflo.

OIL STORAGE TANKS
for distillate, residual and crude oils—kept free of tank bottoms.

JET FUELS
attain thermal stability with Polyflo.

* TRADEMARK

UNIVERSAL OIL PRODUCTS COMPANY
30 ALGONQUIN ROAD, DES PLAINES, ILLINOIS, U.S.A.


more production!
AXELSON—PIONEER IN PROGRESS
more than 1,400,000 bbls. are pumped daily by Axelson products

22%-60% MORE *with*

AXELSON VOLUMAX

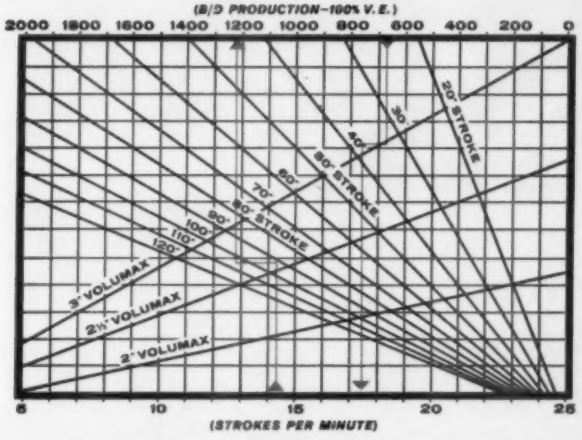
for example:

- In 2" tubing, 2" Volumax (1½" bore) outproduces insert pumps by 66% – tubing pump by 22%.
- In 2½" tubing, 2½" Volumax (2" bore) outproduces insert pumps by 63% – tubing pump by 29%.
- In 3" tubing, 3" Volumax (2½" bore) outproduces an insert pump by 53% – tubing pump by 27%.

PERFORMANCE FACTS

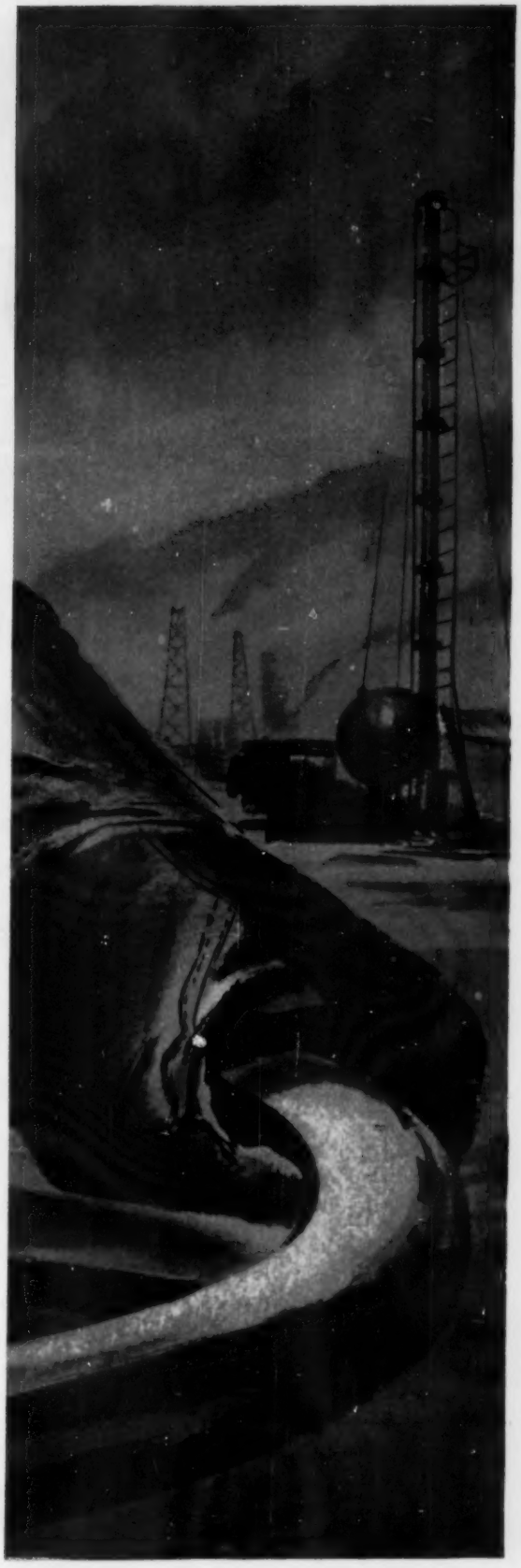
- An insert-type pump, the Volumax allows entire subsurface pumping equipment to be pulled with rods.
- Volumax achieves more production than tubing pump without changing stroke length or cycles per minute.
- Produces equal volumes as tubing pump at reduced cycle rate, reduces dynamic stresses in rod string.
- Allows use of shorter stroke surface unit in shallow, high volume wells.

HERE'S HOW TO APPLY THE VOLUMAX



International Petroleum Exposition

Visit the Axelson
NEW PRODUCTS
Panorama at the I.P.E.
MAY 14-23, 1959



USI Axelson
DIVISION OF U. S. INDUSTRIES, INC.
6160 SO. BOYLE AVENUE • LOS ANGELES 58, CALIFORNIA • LUdlow 7-1271

© 1959—Axelson—Division of U.S. Industries, Inc.

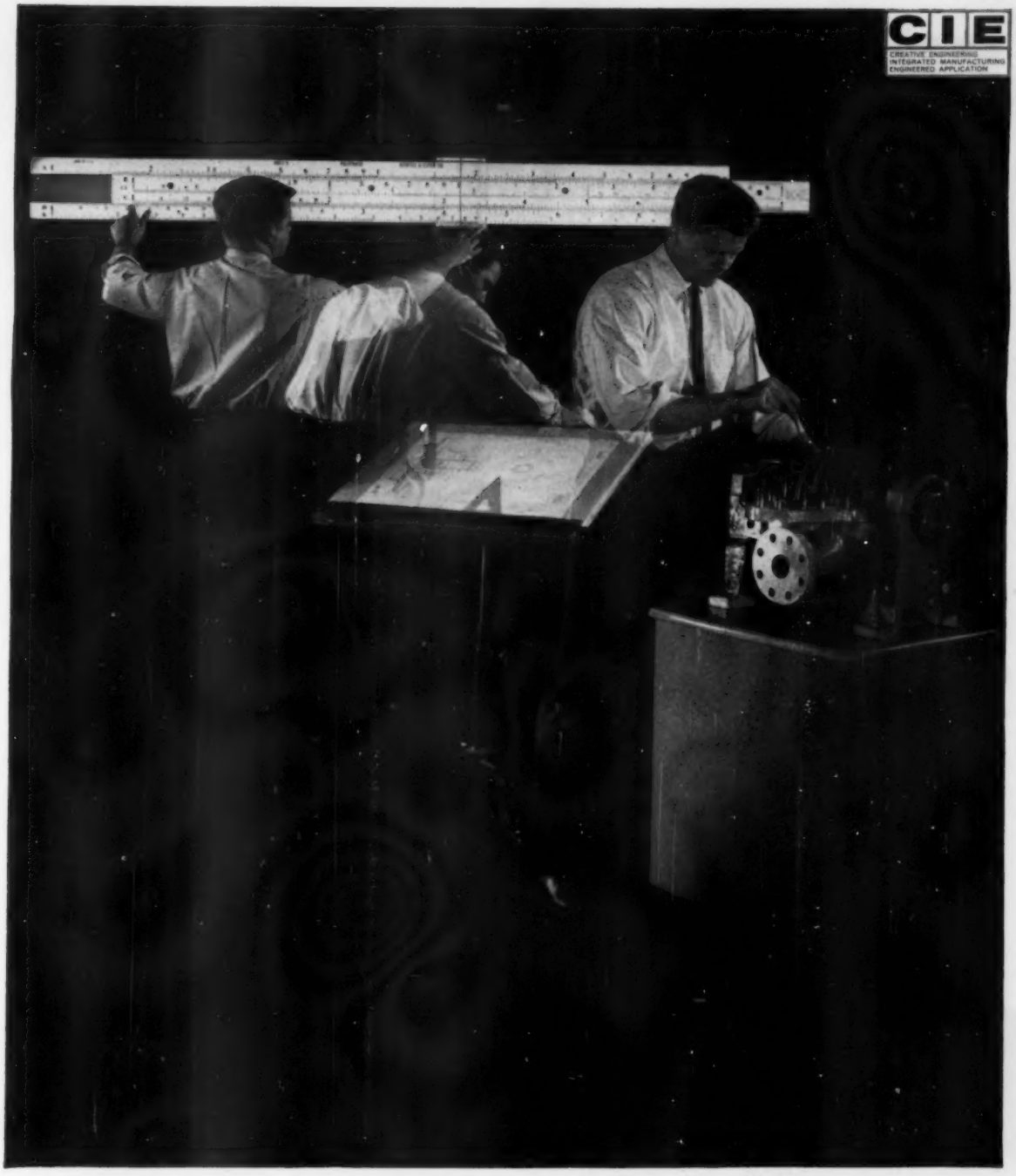
New name, same fame for pipeline protection

Though we've changed the name from Barrett Protective Coatings to Allied Chemical, you'll still receive the same famous protection in Pipeline Coatings which have been proved and improved for three generations. Write for full information.

Pipeline Primers • Pipeline Enamels
Auxiliary Protective Service Materials
Last Word in Corrosion Protection

PLASTICS AND COAL CHEMICALS DIVISION
40 Rector Street, New York 6, N. Y.

Allied Chemical



CREATIVE ENGINEERING at the drawing board helps solve your liquid handling problems on the job. But it takes experience . . . *plus* sweat, skill, and the spark of an idea.

Goulds' design engineers have been "dreaming up" cost- and time-saving solutions to pump problems for over 100 years. More recent achievements include the *glassed* pump for handling corrosives, and the unique *centripetal* self-priming pump for handling liquid and vapors. Such achievements point out that every Goulds pump is built to lick a problem—perhaps *your* problem!

To find out what's available to solve your pumping problems, write to: Goulds Pumps, Inc., Dept. OG-49, Seneca Falls, New York.

GOULDS PUMPS

BRADEN WINCH

responds to remote, push-button pole-setting unit

Tel-E-Lect Products, Inc. is producing a new hydraulically equipped truck with remote control pole-setting unit. Operator, standing outside of truck, controls all equipment from one simple remote control head.

The trucks are equipped with BRADEN M6-15AES Winches, and perform perfectly as an integral part of the control unit.

This is another example of the ingenious ways BRADEN Truck Winches can be used to speed and lighten complicated handling jobs.

Close up of the TEL-E-LECT Remote Control Head.

write for complete winch catalog.

BRADEN WINCH COMPANY
P. O. Box 547, Broken Arrow, Oklahoma

BRADEN Winches

"In Service Around the World"

They Say-

Suppliers in a squeeze

Dear Sir:

You made a very strong case for the supply companies in your splendid article, "Suppliers May Have to Trim Services," (OGJ, Mar. 23, p. 92). I only hope this is the opening gun in a campaign to keep the supply companies in business, as the "squeeze" has been on now for more than a year. The article literally recited our experience of the past 18 months or so.

You touched on a particular sore spot—the "hip pocket" jobber, who can make money at a 3% gross margin of profit because he has no overhead or responsibilities. We have millions invested in strategically located warehouses and stocks and all of the other equipment necessary to give the service which is now required by the customer.

However, the supplier is partly to blame for the situation—competition on a price basis is becoming ruinous.

John W. Newton
President
Norvell-Wilder Supply Co.

All that measures isn't LACT

Dear Sir:

Your Journal issue of March 23 carried an article, "Offshore LACT Unit Sought by Magnolia" (p. 61).

The first paragraph says "Magnolia Petroleum Co. last week asked permission to install Texas' first LACT system for automatic handling, delivery, and measurement of condensate."

This unit, as described, is what we call (the one we make) a Lease Meter Tank, and the accuracy of such volumetric measurements is somewhere in the 1% accuracy range. The accuracy required of a true LACT is .02% accuracy repeatable.

My point in calling this to your attention is that there is a confusing tendency to call any measurement device LACT, whereas a true LACT should be one with sufficient accuracy to permit sale of oil. The proper name for these lease meters is commingling meters.

There is a major API committee on LACT which has this very problem at the top of the list of projects. They hope to define minimum requirements for a true LACT system.

Our concern is due to the damage indiscriminate use of the term can cause in acceptance of qualified cus-

TEIA's case is brief and effective:

25 fully-staffed offices throughout Texas

insure you prompt,

efficient, complete

service.

TIA

FIRST WITH TEXAS INDUSTRY FOR 45 YEARS

AUSTIN F. ALLEN, CHAIRMAN OF THE BOARD | BEN H. MITCHELL, PRESIDENT | HOME OFFICE: DALLAS

tody transfer systems for the sale of merchantable oil.

M. H. Jackson
Manager, Custody Transfer Systems
Murdock Tank & Manufacturing Co.
Tulsa

Not the first time

Dear Sir;

Recently we advised several periodicals of the awarding of the Schlumberger of Canada Scholarship to the Universities of Manitoba and British Columbia for the scholastic year of 1959-60.

Unfortunately, some of the releases have made it appear that this is the first time we have offered this scholarship; however, this is not correct. The scholarship was first awarded for the scholastic year 1955-56. It is a yearly award which is given to the university or universities of our choice for one particular year.

The record shows that the following universities have received scholarships: in 1955-56—University of Alberta, University of Saskatchewan; 1956-57—University of Manitoba, University of Saskatchewan; 1957-58—University of Alberta, University of Toronto; 1958-59—no award made; 1959-60—University of Manitoba, University of British Columbia.

H. C. Gerdes
Vice President
Schlumberger of Canada

Older patent on file

Dear Sir:

I have had a chance to examine the Petroleum Panorama issue of The Oil and Gas Journal with very great interest. It certainly is a terrific job of publication.

The purpose of this letter, though, is to comment on the reproduction of Patent No. 698,033 issued to G. D. Loomis, dated April 22, 1902, which is illustrated on page C-6.

I thought you might be pleased to know that we have the original of this patent in our files, and also have in our files an even older patent issued to George Loomis dated August 18, 1896.

The present Loomis Machine Co. is the same company founded by the Loomis family in approximately 1842. The company has just sold its designs on well drilling equipment but continues to service all Loomis drilling equipment still in use.

M. H. Pryor
President
Loomis Machine Co.
Mansfield, Ohio.

The talk from Washington

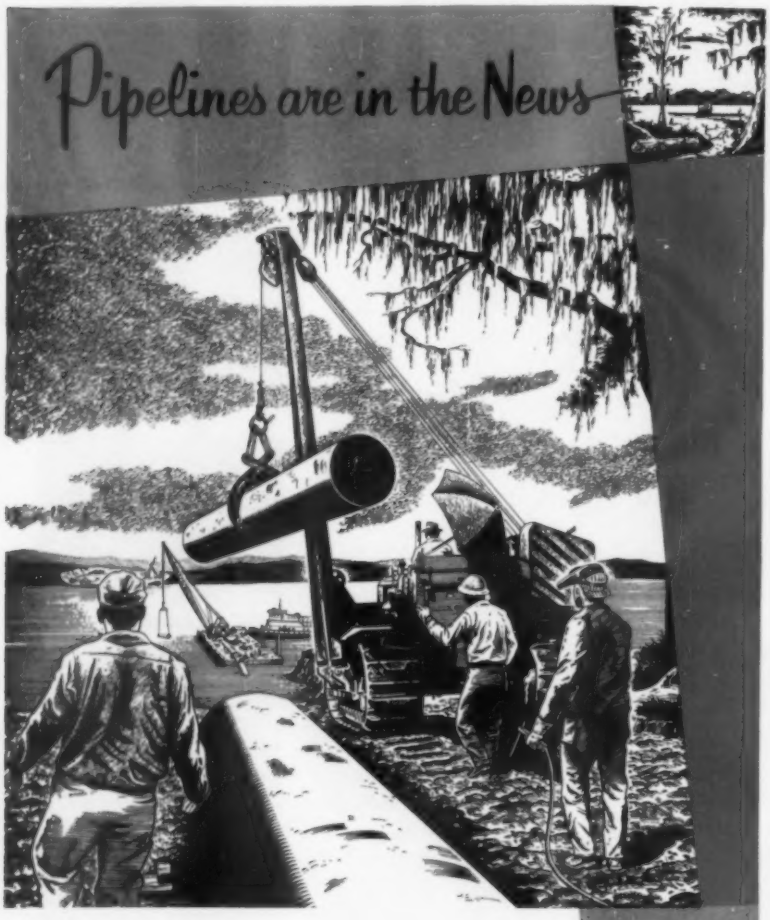
"Our tax structure penalizes most heavily the very people who could build up savings for investment in industry.

"Moreover, there is talk in Washington of a discriminatory corporate income tax. The present tax is high (52%) but at least it is applied equitably.

"A graduated tax would place a penalty on success and make companies unattractive to investors . . . We would wake up some day to find we had no business units large enough to meet United States needs, military or otherwise. What we have here is not a tax to produce revenue, but a philosophical tool which could destroy large industry and weaken our economy disastrously."

Samuel Lenher, vice president, Du Pont Co., in "Better Living," company magazine.

Letters to They Say should be addressed to The Editor, The Oil and Gas Journal, Box 1260, Tulsa, Okla.

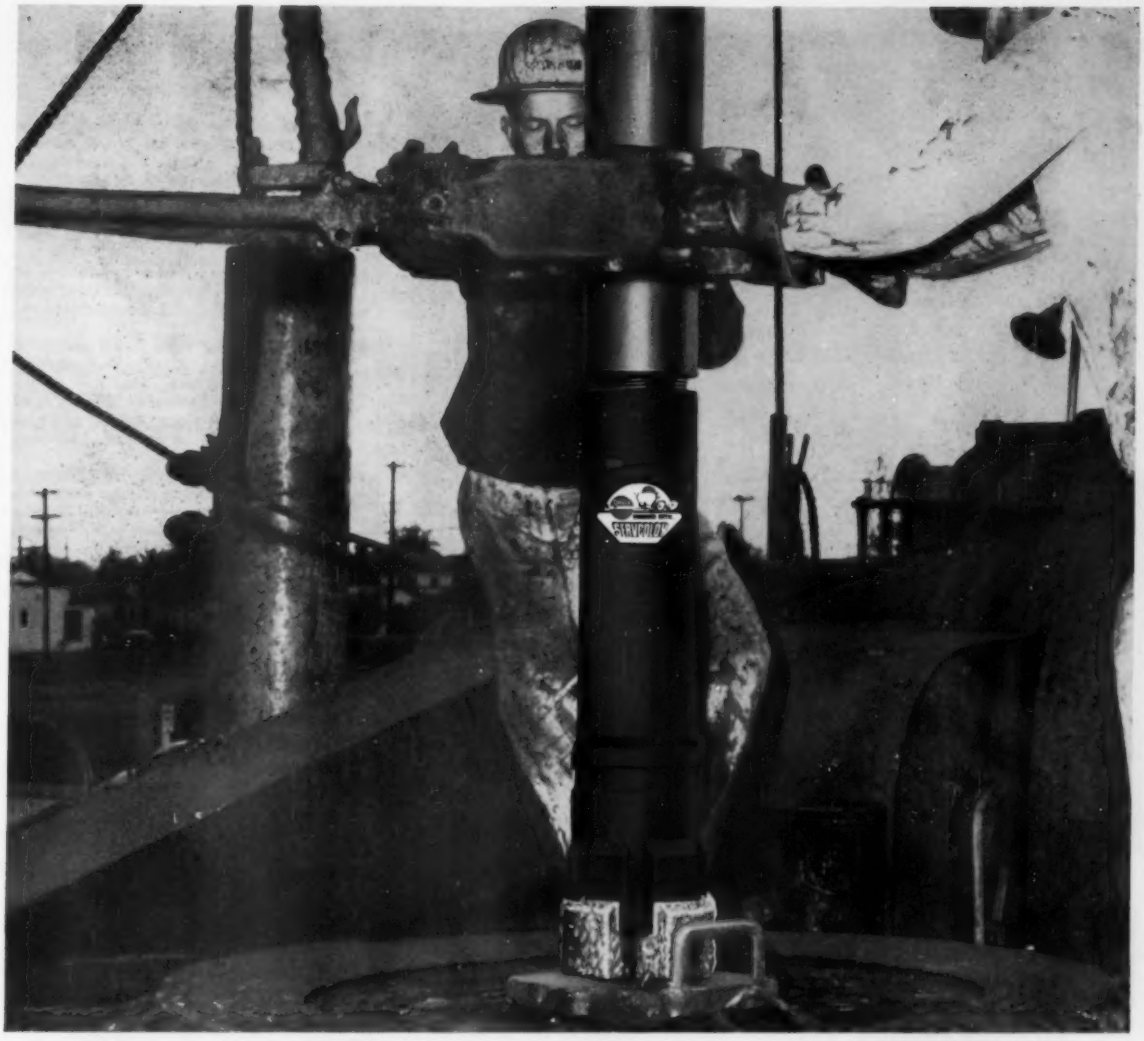


Watch . . . WILLIAMS BROTHERS

New York
Washington — Pittsburgh — Louisville
Minneapolis — New Orleans — Caracas
Bogota — La Paz — Edmonton
Calgary — London — Ankara — Tehran

OIL
GAS
WATER
PRODUCTS
PIPELINE
SYSTEMS

ENGINEERS-CONSTRUCTORS
NBT BUILDING TULSA, OKLAHOMA
CABLE ADDRESS: WILLBROS



Three 6⅛" Bit Cones milled up in 2 HOURS!

Servcoloy-dressed Junk Mills chew up bit cones and other junk with amazing speed; makes this method of removing a fish fast, safe, and very economical.

After three cones from a 6⅛" bit were left on bottom, two rock bits, two hydro-bailers, and two junk baskets were run during a three-day period in attempts to either recover or sidetrack the three cones. Results were negative.

A six-inch Servco CJ Junk Mill dressed with Servcoloy, was then run in the hole. A total of two feet of hole was drilled in a period of two hours of milling. The operator ran back with a bit and proceeded to drill a head. Fine steel cuttings were caught on the shaker during the milling and appeared on the mud screen during the succeeding day, showing that the *cones were actually milled up, not sidetracked.*

Other operators running the Servco Junk Mill report similar results. The astonishing cutting properties of Servcoloy have completely changed thinking about down-hole milling. Why not get complete information from your nearest Servco office?

WHAT IS SERVCOLOY?*

Servcoloy is a patented, hard-facing material which uses a unique method of suspending bits of carbide in a tough, elastic matrix. As the carbide cutting edges are worn away or torn from the matrix, new edges are automatically exposed. Servcoloy is now being used on Servco milling tools such as section mills, rotary shoes, taper mills, pilot mills, etc. Remedial work which formerly took days to do is now being done in hours.

SERVCO

General Offices: 2440 Cerritos Ave., Long Beach 6, California
Gulf Coast and Mid-Continent: 4850 Gasmer Street, Houston 35, Texas
Canada: 6909 - 104th Street, Edmonton, Alberta **Venezuela:** Maracaibo

Field Offices: Ventura, Bakersfield, Lafayette, Harvey, Oklahoma City

*U.S. Patent No. 2,833,638

SHAMCO TEFLON® SHEET CONTINUOUS MOLDED TO ANY LENGTH, WIDTHS UP TO 48 INCHES

Need a low friction skid? Or a moisture-proof gasket? Or a non-adhesive lining? Then try SHAMCO Teflon sheet! A supply of this versatile Teflon material is fast becoming a standard item in plants, refineries and laboratories throughout industry. There are many reasons: it's heat resistant (550°F), it's chemically inert, it's non-adhesive, it's easy to use, it can be bonded to practically any material, and now it's available in *widths up to 48 inches by any length you want.* Order some SHAMCO sheet soon and, while you're at it, try some of the other SHAMCO standard shapes!

Tough, flexible, non-adhesive, chemically inert, heat resistant, low friction and weather proof, SHAMCO sheet and other shapes are now being used in:

- SOLID GASKETS
- NON-ADHESIVE LININGS
- BAFFLES
- SEPARATORS
- DOORSLIDES
- SKIDS
- BREAD SHEETING ROLLS
- GUIDES, HOPPERS and DEAD PLATES
- SNOW and DIRT PLOW BLADES
- SLOT LINERS
- COIL SEPARATORS
- BASES FOR SUB-ASSEMBLIES
- LAYER INSULATION

Engineered Plastic Products
W. S. SHAMBAN & COMPANY
11617 W. Jefferson Blvd., Culver City, Calif.
Meyer Road, Ft. Wayne, Indiana
160 Woodbine Court, Floral Park, New York
Stocking Distributors in Principal Cities

CALENDAR

APRIL

19-23 American Society of Mechanical Engineers, oil and gas power conference and exhibit, Shamrock-Hilton Hotel, Houston.

22-24 American Petroleum Institute, Division of Production, Mid-Continent district meeting, Herring Hotel, Amarillo, Tex.

22-24 Natural Gasoline Association of America, thirty-eighth annual convention, Baker and Adolphus Hotels, Dallas.

23-24 Sixth annual West Texas oil lifting short course, Texas Technological College, Lubbock, Tex.

24 Society of Petroleum Engineers of AIME, Gulf Coast drilling and production practices meeting, Lafayette, La.

24-25 Society of Economic Paleontologists and Mineralogists, Pacific Coast section, annual spring field trip, Boulder Creek area of Santa Cruz Mountains, California.

25 American Institute of Chemical Engineers, annual joint Oklahoma state meet, Engineering Auditorium, Oklahoma State University, Stillwater, Okla.

26-28 Texas Independent Producers and Royalty Owners Association, membership meeting, Baker Hotel, Dallas.

27-28 Society of Exploration Geophysicists, annual midwestern meeting. Cortez Hotel, El Paso, Tex.

27-28 University of Oklahoma and Oklahoma City sections of American Institute of Electrical Engineers and Institute of Radio Engineers, fourth annual conference on automatic control in the petroleum and chemical industries, Norman, Okla.

29-30 Western Petroleum Refiners Association, Southwest regional technical-industrial relations meeting, Hotel Paso del Norte, El Paso.

29-30 Pacific Coast Gas Association, operating section, transmission conference, El Mirador Hotel, Palm Springs, Calif.

30-May 1 American Petroleum Institute, Division of Production, Pacific Coast district meeting, Biltmore Hotel, Los Angeles.

30-May 2 Fort Smith, Ark., Geological Society, field trip and conference on Western Arkansas Valley gas area, registration, April 30, Ward Hotel, Fort Smith.

MAY

1 Fourth annual petroleum accounting conference, sponsored by Wichita chapters of the Petroleum Accountants' Society of Kansas, National Association of Accountants, the Kansas Society of Certified Public Accountants, and the University of Wichita, Lassen Hotel and University of Wichita campus, Wichita.

3-6 Liquefied Petroleum Gas Association, twenty-eighth annual meeting and trade show, Conrad Hilton Hotel, Chicago.

4-5 American Society of Mechanical Engineers, maintenance and plant engineering division conference, Edgewater Beach Hotel, Chicago.

4-5 Independent Petroleum Association of America, midyear meeting, Westward Ho Hotel, Phoenix.

4-7 American Geophysical Union, annual meeting, Washington.

5-7 Purdue University, fourteenth Purdue

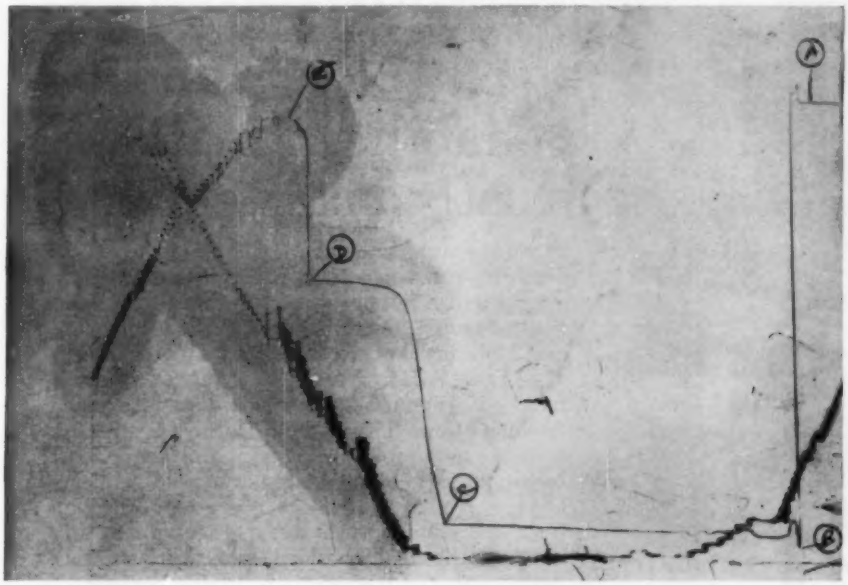
168 Barrels Of Oil A Day From A Dry Hole

This is the story of how an apparent dry hole was made a 168 bopd producer. The well was drilled by Mr. A. C. Torgeson of Torgeson Oils, Inc. who realized a successful producer from a wildcat well that could easily have been abandoned. The well was spudded in Weld County, Colorado, and was projected for the "J" sand around 6900 ft. The sand, when reached, was cored and an electric log was run. These revealed conclusively that the "J" sand was unproductive . . . that it contained only water. Had it not been for the alertness of the consulting geologist on the well, Paul "Skipper" Keller, the well would have been plugged and abandoned. Keller, however, had noticed an oil show in the cuttings from the "D" sand approximately 100 feet up the hole. The "D" sand was generally unproductive in the area and a thorough study of all available evidence indicated that it probably would be unproductive in this well even though there was a show in the cuttings. Normally a well of this type would have been abandoned immediately, but Mr. Keller was reluctant to do this in spite of the seemingly overwhelming odds against making a successful producer. The decision was then made to run a drill stem test in order to evaluate all the available information. The result was a producer!!!

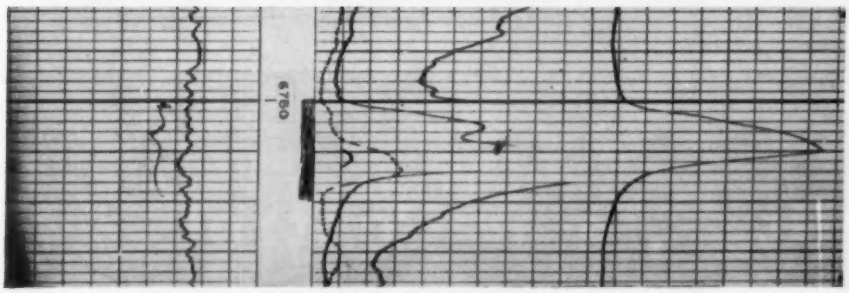
To obtain the test information which resulted in a positive decision to complete the well, Johnston Testers was called in from the Fort Morgan office and a straddle test was run. On the basis of the drill stem test, casing was set and the well perforated from 6758 to 6764 ft. The initial flow of the well was 168 bopd through a 30/64" choke. No well stimulation treatment was required and a dry hole became a producer.

This is an excellent example of the necessity of gathering and evaluating all the data possible before setting casing on a well that might be dry, or before abandoning a possible producer.

This well clearly demonstrates that it is unwise to discount any possible pay or write-off any well prematurely. It also demonstrates that Drill Stem Testing pays off in handsome dividends. The cost of a drill stem test is very small compared to the investment made in the drilling of the well. Test—to be absolutely sure.

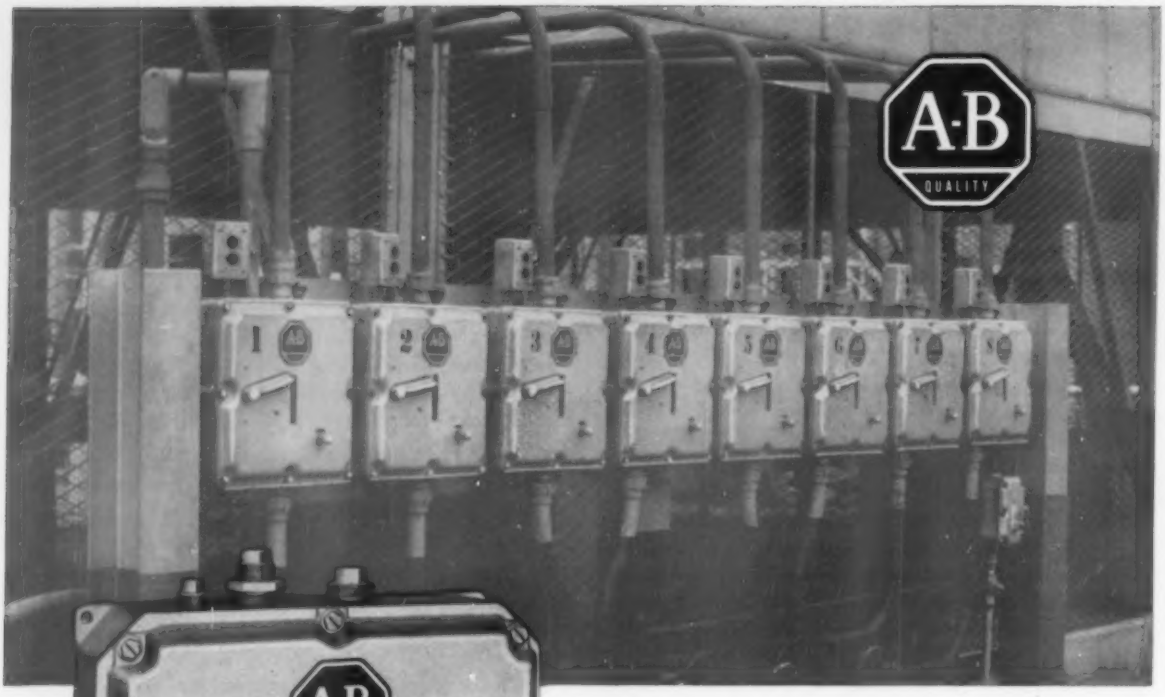


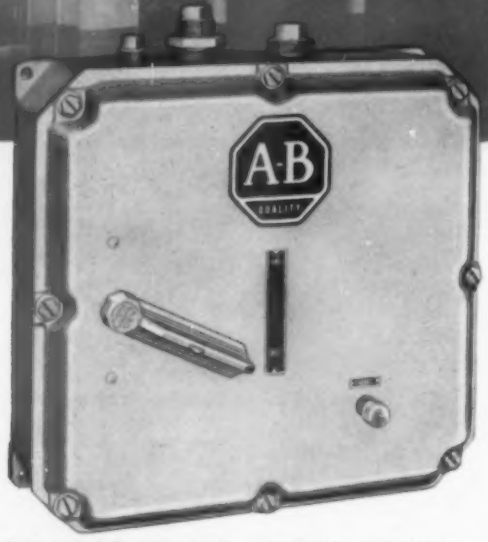
Drill Stem Test chart for the Torgeson State No. 1. Tool was open for two hours with forty-five min. shut-in. Gas to surface in 18 min. (800,000 cu. ft.) and a good blow was observed. 550 ft. of oil and 270 ft. of oil and gas cut mud were recovered. No water was present. Initial flow (B) was 108 psi and final flow (C) was 291 psi. Final shut-in pressure (D) was 2221 psi.



Log showing SP and Resistivity curves at perforated interval.

JOHNSTON DRILL STEM TESTING TESTERS





Bulletin 713 Combination Starter with circuit breaker in NEMA Type 9 enclosure for hazardous dust locations.

NEMA 7
For Hazardous Gas Locations

NEMA 4
Watertight Weatherproof

NEMA 8
For Corrosive Hazardous Gas

NEMA 11
Corrosion-proof

Round-the-clock safety . . . and reliability . . . without costly maintenance

When hazardous locations require starters in explosion-proof enclosures, it usually means costly maintenance. But *not* when you use A-B starters, because you eliminate the expense of removing and replacing bolted covers for "regular" inspection! In all A-B starters there is only ONE moving part. This is your assurance of *millions* of trouble free operations. There are no bearings to stick . . . no flexible jumpers to break. And the double break, silver alloy contacts never need servicing —they remain in perfect operating condition until completely worn away. The permanently accurate thermal overload relays are another "plus" feature. Insist on Allen-Bradley controls . . . and save on maintenance throughout the years.

ALLEN-BRADLEY
Quality Motor Control

Allen-Bradley Co., 1304 S. Second St., Milwaukee 4, Wis. • In Canada: Allen-Bradley Canada Ltd., Galt, Ont.

industrial-waste conference, Purdue Memorial Union Building, Lafayette, Ind.

6-7 Panhandle Producers and Royalty Owners Association, annual meeting, Amarillo, Tex.

6-8 American Petroleum Institute, Division of Production, Rocky Mountain district meeting, Gladstone, Henning, and Townsend hotels, Casper, Wyo.

7-8 Society of Petroleum Engineers of AIME, Permian Basin section oil recovery conference, Midland, Tex.

7-8 Rocky Mountain Oil and Gas Association, refining committee annual meeting, Petroleum Club Building, Denver.

13-15 American Petroleum Institute, Division of Transportation, annual pipeline conference, Pittsburgh.

13-15 Canadian Institute of Mining and Metallurgy, tenth annual technical meeting of the Petroleum and Natural-Gas Division, Macdonald Hotel, Edmonton.

14-23 International Petroleum Exposition, Tulsa.

25-27 Chemical Institute of Canada, forty-second annual conference, Halifax, N. S.

25-27 American Society for Quality Control, annual convention and exposition, Public Hall and Hotel Sheraton Cleveland, Cleveland.

25-28 American Society of Mechanical Engineers, machine-design division, design-engineering conference, and Clapp & Poliak, Inc., design-engineering show, Convention Hall, Philadelphia.

27-29 American Petroleum Institute, Division of Marketing, midyear meeting, Savery Hotel, Des Moines.

27-29 Southern Gas Association, fourteenth annual short course in gas technology, Texas College of Arts & Industries, Kingsville, Tex.

27-30 American Petroleum Institute, Division of Refining, midyear meeting, Statler Hotel, New York.

30-June 5 Fifth World Petroleum Congress, Coliseum, New York.

JUNE

2-4 Appalachian Underground Corrosion Short Course, University of West Virginia, School of Mines, Morgantown, W. Va.

4-5 Kentucky Oil and Gas Association, annual meeting, Phoenix Hotel, Lexington.

8-9 University of Michigan, School of Public Health and College of Engineering, short course on industrial water conservation, Ann Arbor, Mich.

10 American Association of Oil Well Drilling Contractors, tristate chapter, annual safety clinic, Carmi, Ill.

10-12 Instrument Society of America, second international symposium on gas chromatography, East Lansing, Mich.

10-13 American Association of Petroleum Landmen, fifth annual convention, Skirvin Hotel, Oklahoma City.

14-18 American Society of Mechanical Engineers, semiannual meeting, Chase and Park Plaza Hotels, St. Louis.

14-19 Society of Automotive Engineers, summer meeting, Chalfonte-Haddon Hall, Atlantic City.

15-17 Interstate Oil Compact Commission, midyear meeting, Roosevelt Hotel, New Orleans.

21-26 American Society for Testing Materials, annual meeting, Chalfonte-Haddon Hall, Atlantic City.

STRAN-STEEL BUILDINGS—NOW IN COLORS!

Rigid-Frame 40' x 100' research laboratory with spacious office facilities.

Colorful STRAN-STEEL buildings are made to serve your industry better

For a surprisingly low cost per square foot, you can own a good-looking, hard-working Stran-Steel building. Designed for your specific service or laboratory facility, warehouse processing plant or office need—designed to help you step up efficiency. Stran-Steel buildings are available in your choice of six factory-applied, baked-on colors (blue, bronze, green, gray, rose or white). Stran-Satin Colors are handsome themselves, and blend beautifully with brick, stone, wood or glass.

The low price of an efficient, good-looking Stran-Steel building is made possible by precision mass production. Owning one almost always costs less than rent payments for similar space. Our five-year purchase plan, which requires an initial investment of only 25%, can be handled by your Stran-Steel dealer, who will also take responsibility for planning and construction, if you like. For full information, mail the coupon or call the Stran-Steel dealer listed in the Yellow Pages under *Steel Buildings or Buildings-Steel.*

Lengths in 24' or 20' multiples and a full range of widths—with spacious column-free interiors.

Stran-Steel

DEALERS EVERYWHERE

Dept. OGJ-18
STRAN-STEEL CORPORATION
Detroit 29, Michigan • Division of
NATIONAL STEEL CORPORATION

Stran-Steel Corporation, Dept. OGJ-18
Detroit 29, Michigan

Please send catalogs on Industrial Buildings and Stran-Satin Color.

Name_____ Title_____

Company_____

Address_____

City_____ Zone____ State____

"...pacing the pipeline construction industry
for more than a quarter century"

price tower H·C·PRICE·CO PIPELINE CONSTRUCTORS bartlesville, oklahoma

the OIL AND GAS JOURNAL

TULSA, OKLAHOMA
Published every Monday by The Petroleum Publishing Co., 211 South Cheyenne Avenue, Tulsa, Okla. Phone LUther 4-4411. Founded in 1902. Name changed to The Oil and Gas Journal in 1910 by Patrick C. Boyle.

P. C. LAUINGER
President
S. H. ROURKE
Executive Vice President
KENNETH B. BARNES
Vice President and Editorial Director
MITCHELL TUCKER
Vice President and Advertising Manager
HANSON B. PIGMAN
Circulation Manager
DONALD W. WILSON
Manager Industry Census Department
J. PARKER HOLLAND
Production Manager

ADVERTISING OFFICES
TULSA
211 South Cheyenne, LUther 4-4411
JOHN D. REILLY....Mid-Continent Manager
ROY E. FINLEY.....Representative
D. B. MILLER.....Classified Adv. Mgr.
NEW YORK
500 Fifth Avenue, LOngacre 4-1910
E. S. KLAPPENBACH.....Eastern Manager
HARRY B. BULLEN.....Representative
PHILADELPHIA
1509 Land Title Building
Broad and Chestnut Streets,
Rittenhouse 6-0118
JOHN W. MEANY, JR.....District Manager
CHICAGO
105 West Madison Street, CEntral 6-2537
DAVID T. KENNEY.....District Manager
KAREL WEGKAMP.....District Manager
DETROIT
204 Washington Square Building
Royal Oak, Mich., LIncoln 7-9455
JOHN D. YODER.....District Manager
PITTSBURGH
Law & Finance Building, 429 Fourth Ave.
Room 1505, GRant 1-5847
ERNEST S. HOLZWORTH..District Manager
HOUSTON
802 American Investors Building
CApitol 4-7726
JOHN M. SPEARS.....Gulf Coast Manager
DALLAS
1238 Mercantile Building
Riverside 8-3074
PREN G. HOLLINGSWORTH..Representative
LOS ANGELES
650 South Grand Avenue, MAdison 2-0722
GEORGE O. RUPPERT.....District Manager
ENGLAND
National Provincial Bank Chambers
15 Grafton Street, Altrincham
Phone Altrincham 3160
HARRY BECKER....European Representative

Subscription rates to the petroleum industry United States and foreign, 1 year, $5.00; 2 years, $8.00; 3 years, $10.00. Single copies $1.00. Back copies when over a year old, $2.00. Note: Payments from outside the U.S.A. may be made by international money order, New York exchange, or check on a U.S.A. bank. Second-class postage paid at Tulsa, Oklahoma. Copyright 1959 by the Petroleum Publishing Co.

Member
Audit Bureau of Circulations
Associated Business Papers

JOURNALLY SPEAKING

Hi, Sucker!

THERE'S STILL a sucker born every minute, and the naivete of some people on the fringes of the oil business is truly amazing.

We trust that regular readers of the Journal realize that we are not in the business of promoting lease sales. When we print an article saying that a certain area is getting an active play or has interesting geological potentialities we are simply reporting facts and not passing out inside tips on how to get rich quick.

We never make any specific recommendations as to where a man should risk his money by buying a lease or drilling a well. If we were that smart we'd all be rich and the hell with the headaches of getting out a magazine every week.

But there's a brotherhood of unscrupulous lease brokers who don't believe that—or who profess not to believe it. They cause us a lot of trouble and embarrassment.

No doubt you have received promotional material from some of these gentry exhorting you to cash in on the opportunity of a lifetime by buying a piece of an oil lease he has just acquired in the hottest wildcat play in the country.

And the chances are that The Oil and Gas Journal is extensively quoted (or misquoted) to prove to the doubters that the world's greatest oil authority is positive that this lease will make you a second Rockefeller.

Oh it's very flattering, the things they say about the Journal and about our exploration editor, Frank Gardner. But we don't fall for that kind of flattery. We don't want that kind of promotion. And we hate to see gullible investors rooked of their money through misuse of our name and our articles.

Just recently we ran across an example of this—a flowery and flamboyant piece of promotion literature put out by a Fort Worth lease broker. For $10 you could buy an acre lease in an area in Oklahoma that was almost certain to become one of the world's greatest petroleum reserves and put you in the class with Harry Sinclair, Frank Phillips, and W. G. Skelly.

And who says so? Why, none other than the great Oil and Gas Journal, than which there is no whicher.

This guy's sales pitch rested entirely on an article by Frank Gardner reporting a more-or-less routine exploration play in a nonproducing area which some professional geologists consider worth looking at. Such a report is useful news to bona fide explorationists, and that's why we print such material.

But this buzzard wrote six pages of hoopla peppered with "Dr. Gardner says . . . " mixed up with his own pseudoscientific gobbledegook and "interpretative" extravaganza—all artfully designed to convey the impression that Gardner and the Journal are sure that this particular lease will be the site of another Spindletop.

So our attorney wrote him a brusque letter asking by what authority he violated our copyright.

And you should see his reply! Either he is a mighty suave letter writer or else he is more naive and wet behind the ears than his intended victims.

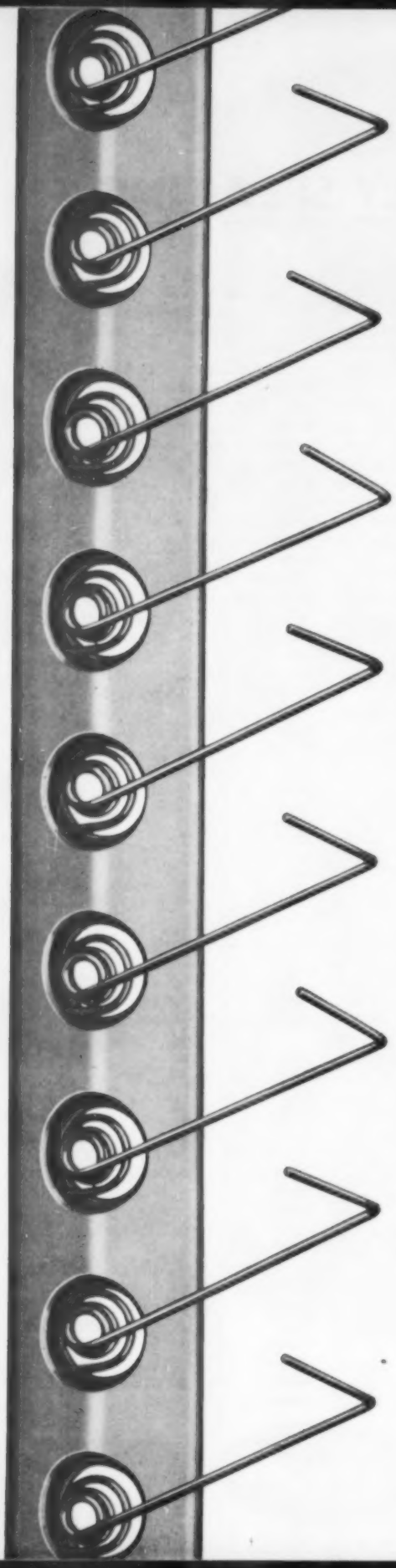
Why, it never occurred to him that "a long-time admirer of the Journal" shouldn't take its words as "gospel." A sample paragraph:

"I have such faith in the Journal's fact-reporting and admire so much the manner of presentation, so far superior to my own poor abilities, that I felt there was no better way to convey to my associates the facts I wanted them to have than to tell them what the Journal said—for, as you know, everyone who is familiar with the Journal regards it as 'the oil man's Bible'."

There was a lot more of such simpering buttering-up. But this flattery got him nowhere. By registered mail (return receipt requested) he got plain-language orders never to quote our articles or use the name of our magazine or our staff members in any lease sales.

This may stop this guy, but there are plenty of other sharpers spreading bait for suckers who think oil investing is a glamorous gamble. So, please, next time you get such a promotion letter, send it in to us and we'll try to squelch it. We don't like being played for suckers.

—Henry D. Ralph



is WALL SCRATCHING "POINTLESS?"

NOT WHEN YOU USE Baker ROTATING Wall Scratchers

WITH "PLOW ANGLE" WIRES!

Operators who prefer "Rotating-Type" Scratchers will find the new Baker *ROTATING* Wall Scratcher (Product No. 903) far more effective than typical scratchers with "pointless" trailing wires. See in Fig. 1, how the right-angle bend at the ends of the wires in Baker *ROTATING* Scratchers provides a "plow angle" point which *must* dig in and effectively remove mud cake. Compare these results with the "pointless" action of trailing wires which are *merely dragged over* the mud cake without removing it; see Fig. 2.

Note also in Fig. 3, how the "plow angle" scratching point is maintained over a wide range of clearances—even under slim hole conditions—as each wire automatically adjusts to meet the wall of the hole.

Shock absorbing spiral springs, mechanically held by the *double* body thickness, prevent distortion of the scratcher wires both while running-in the hole and throughout the scratching operation.

Ask the Baker representative in your area for details of spacing and installation. Try this successful aid to "first-time" cementing.

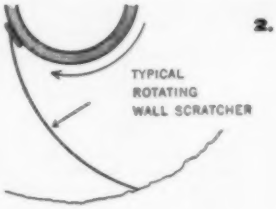
If you prefer RECIPROCATING *Type Wall Scratchers, Baker Solid-Ring* SLIP-ON *Scratchers, or Baker* HINGE-LOK *Wall Scratchers will bring you* CONTROLLED SCRATCHING *by removing the mud cake only throughout the area to be cemented.*

BAKER OIL TOOLS, INC.

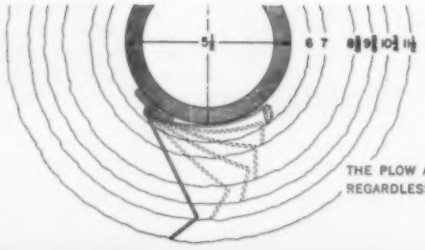
HOUSTON / LOS ANGELES / NEW YORK

1.

2.



3.



You refiner: Get back in step quick

THE REFINING BRANCH of the industry is going to have to pay for its splurge of optimism and its spree of high-wide-and-handsome crude runs of the past few weeks.

It can pay up in full during the rest of April and May by cutting runs deeply and wiping the slate clean of its debit of excess stocks.

Or it can prolong the agony by paying on the installment plan through chaotic markets, price wars, and impaired earnings all summer.

THE OFFENSE COMMITTED was to let products stocks get far above actual or anticipated demand. The reason may be chalked up to expectation that winter was here to stay, premature reliance on the effect of imports control, heady exuberance, or some other manifestation of financial myopia.

But the deed has been done. Now those who danced must pay the fiddler. The excessive inventory is hanging over the industry, and just not looking at it won't make it go away.

It can be made to go away by cutting crude runs sharply right now and drying it up in a few weeks. Or it can be carried until such time, maybe fall, when increased consumption will gradually work it down.

Excess supply of products has been the chief cause of the past year's low earnings, disrupted markets, and weak prices. To continue the excess means to stretch out the trouble period.

Refiners try to unload their own surpluses by distress sales to private-brand marketers, or by price wars, or by giving motorists green stamps or chances on bicycles, trips to Las Vegas, or solid-gold Cadillacs.

Such antics don't increase total consumption or decrease national stocks one gallon. But they do mesmerize other marketers into joining an orgy of mutual throat-cutting which leaves them all—and the rest of the industry too—in a weakened condition.

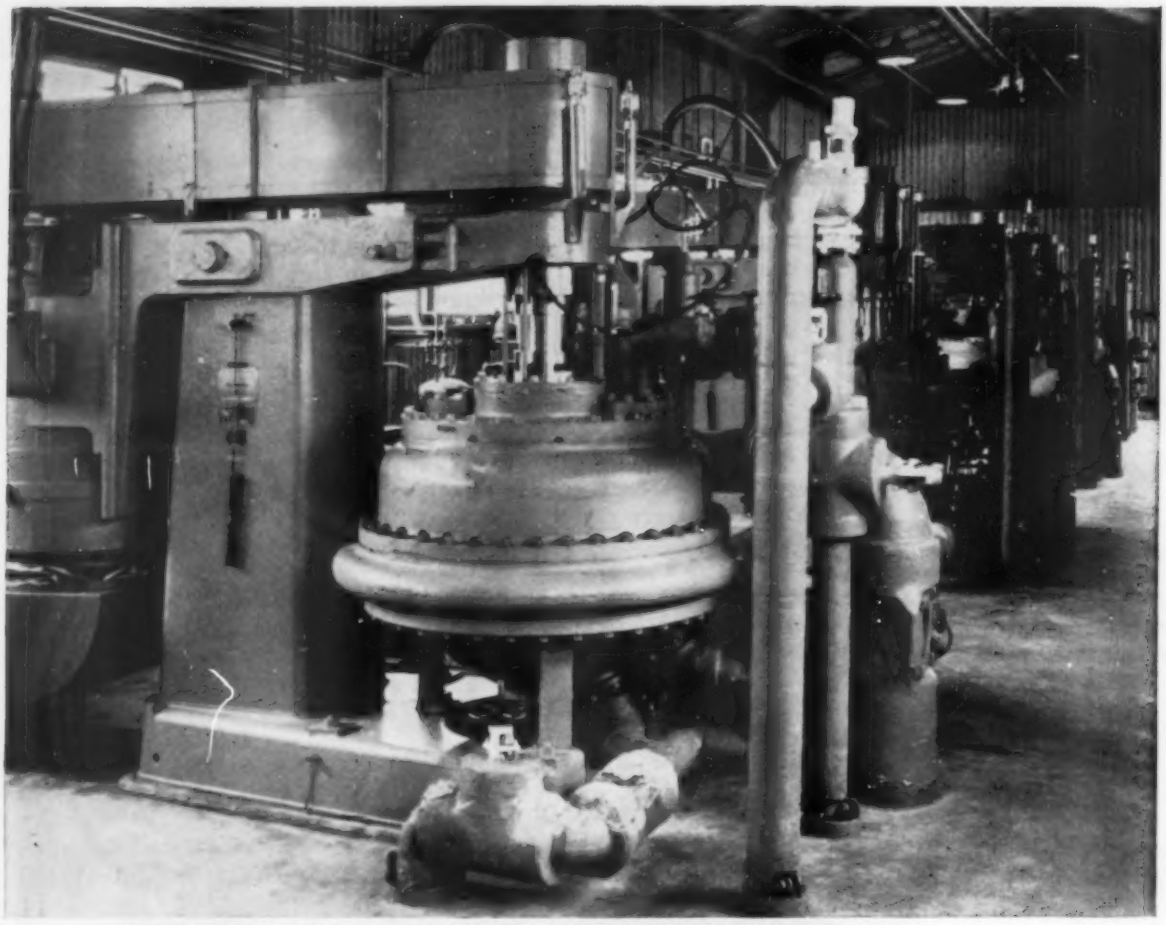
The mid-April figures on runs and stocks shocked some refiners out of their dream world. Runs dropped a little last week. But the corrective action must be more widespread and more severe if it is to bail out the industry this spring. Everybody ought to cut—quick and deep.

OPTIMISM OVER the improving outlook in some areas of the oil industry blinded everyone to the potential disaster building up in products tanks everywhere. The picture was distorted.

What actually happened was that much of May's crude was run in March and early April and the products from it won't be consumed until June or later. It will take a general slowdown to get back in step.

The blame can't be laid on "the other fellow." It lies with every refiner. And the rest of the industry will know whom to blame if its incipient prosperity is wrecked by continued high refinery runs.

MORE PRODUCTION OF HIGH DENSITY POLYETHYLENE!



MERCO PRESSURE CENTRIFUGES

operate 24 hours a day . . . 7 days a week . . . at W. R. Grace's Polymer Chemicals Division

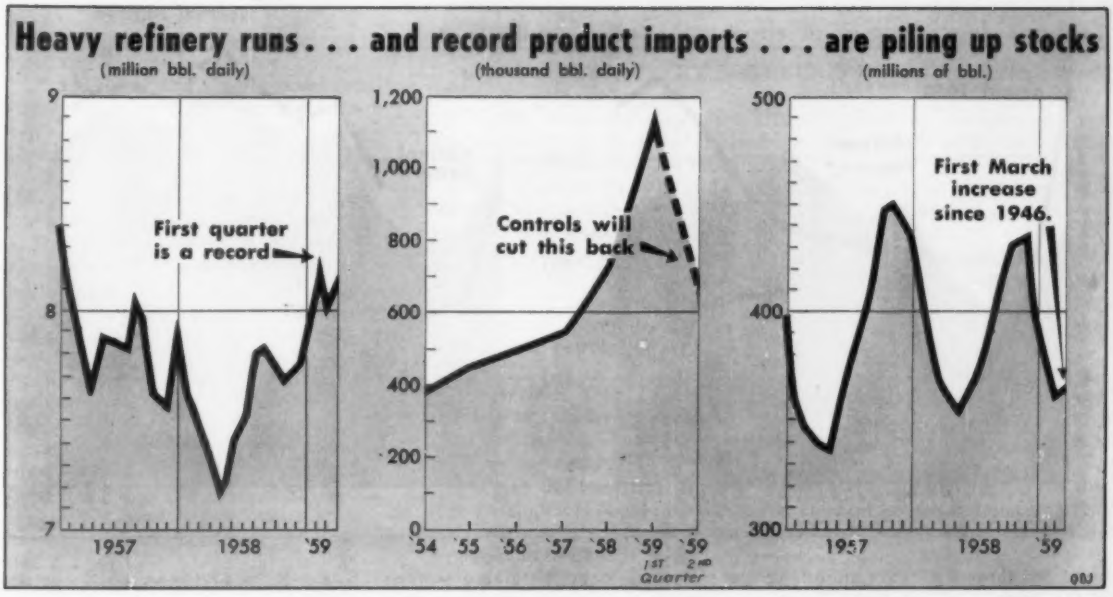
Large-scale production is provided in the plant of the W. R. Grace Polymer Chemicals Division to answer the growing demand for high-density linear polyethylene. The product is marketed under the trade name of GREX and is manufactured under license by the Phillips process.

For the catalyst removal step, Merco Pressure Centrifuges insure high quality product and continuous operation. The polyethylene polymer solution containing catalyst is fed through Merco Rotary Strainers to Merco Pressure Centrifuges which operate 24 hours daily, 7 days a week at superatmospheric pressures and temperatures. Each centrifuge can deliver an effluent product of *less than 8 ppm* impurity. Two-staging of the polymer-catalyst separation results in very high polymer recovery.

Merco Continuous Pressure Centrifuges and Strainers are the *only* units of their type continuously effecting a polyethylene-solid catalyst separation. The Merco Pressure Centrifuge has revolutionized many operations in the processing industries, where continuous efficient, high speed, controlled separation is required. Types are available to suit a wide variety of applications. For information, write Dorr-Oliver Incorporated, Stamford, Conn.

DORR-OLIVER
INCORPORATED
WORLD-WIDE RESEARCH • ENGINEERING • EQUIPMENT
STAMFORD • CONNECTICUT • U. S. A.

Merco — TM Reg. U. S. Pat. Off.



Refinery Runs: Key to '59 Success

● Sunray and Conoco move to throttle down plants after industry production in March outstrips demand, causes early increase in product stocks. What other refiners do will determine industry prosperity for rest of year.

W. A. Bachman, district editor, and **John C. Casper**, economics editor.

THE OIL industry generally enjoyed a very prosperous first quarter. But signs of trouble the rest of the year are gathering. They'll grow unless refinery runs are cut quickly and sharply.

The key role in 1959 industry prosperity played by runs is this:

Their terrific volume, plus the record imports of products, has prevented the normal reduction of products stocks in February and caused an unusual stock jump in March.

This stock trend threatens both the price structure and the industry balance achieved last year only after a hard struggle.

The relation of these factors is illustrated in charts above. Now let's examine each separately.

Record runs . . . Refinery crude throughput in the first quarter has set a record for a 3-month period.

Runs in January averaged 8,230,000 bbl. daily, in February 8,070,000 bbl. daily, and in March 8,150,000 bbl. daily. The first-quarter total topped the volumes run in 1957's first quarter when the Suez Canal was closed.

Trouble with high runs is not new. Only last year runs were cut sharply to reduce stocks. These had built up because reopening of Suez cut back demand but runs had remained high.

The 1958 result was dramatic: A first-quarter 1958 drop in runs of 620,000 bbl. daily under the same period in 1957 and a second-quarter drop of 500,000 bbl. daily.

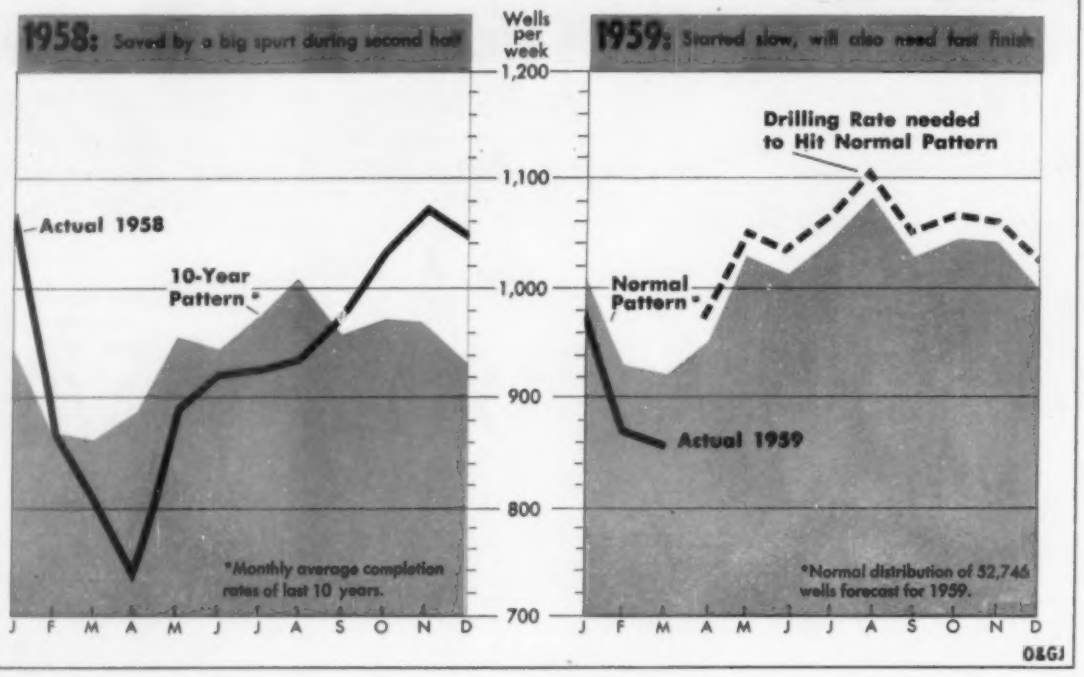
However, runs tended to move back up in the last half of 1958. In fact, if it hadn't been for a sudden spurt in demand in December, stocks would have been too high at the end of 1958.

Runs normally move up slightly in January and February, particularly if very cold weather brings a jump in heating-oil demand. The real point of concern this year was the upturn in March. The spring pattern calls for decreasing runs in March with the low point for the year in April.

The summer upturn in runs normally comes in May, but the average for March was more than enough to cover midsummer demands. In fact, preliminary reports indicate that March runs were the third highest on record. The highest was in January 1957 during the Suez crisis, and the second was in January this year.

Role of imports . . . The heavy refinery runs have been aggravated by

Drilling Needs a Fast Pickup to Meet Its 1959 Goal


1958: Saved by a big spurt during second half
Wells per week
1959: Started slow, will also need fast finish
1,200
1,100
1,000
900
800
700
Drilling Rate needed to Hit Normal Pattern
Actual 1958
10-Year Pattern*
Normal Pattern*
Actual 1959
*Monthly average completion rates of last 10 years.
*Normal distribution of 52,746 wells forecast for 1959.
J F M A M J J A S O N D
J F M A M J J A S O N D
OE&GJ

the record flow of product imports so far this year.

These imports averaged 1,149,000 bbl. daily, of which 846,000 bbl. daily was residual. This record volume followed a high fourth-quarter 1958 average of 905,000 bbl. daily.

The excessive nature of these imports is shown by comparison with past years. The average for 1957 was 552,000 bbl. daily. The 1958 average was 742,000 bbl. daily.

However, under the new mandatory imports control program, products will be cut back. The prospect for the second quarter this year is 630,000 bbl. daily.

The pile up . . . Domestic demand has been better than expected.

The first-quarter average was 10,440,000 bbl. daily. Forecast of The Oil and Gas Journal called for 10,135,000 bbl. daily.

Actual demand ran like this: January, 11,077,000 bbl. daily; February, 10,470,000 bbl. daily; March, 9,770,000 bbl. daily. In each instance the average was higher than 1958.

But still the demand was not sufficient to offset heavy refinery runs, product imports and normal stock withdrawals. The result was the first March increase in four-product stocks since 1946.

March product stock levels are the highest in the last 3 years. However, the upward trend here too, worries oil economists more right now than the comparison with past years. The 1957 and 1958 March stock levels were abnormally low at that time because of unusual cutbacks. In 1957 it was the Suez crisis drawdown. In 1958 the big industry reduction was in full swing in March.

The stock levels might have been even higher except for unusually cold weather in December and January. Stocks took a 41,000,000-bbl. slide in December, dropped another 25,000,000 bbl. in January, and 9,000,000 in February before the March upturn.

At the end of March, four-product stocks totaled 367,000,000 bbl. That's 20,000,000 bbl. over the highest level which oil-company executives told the Texas Railroad Commission was desirable.

What's answer? . . . Three refiners have announced they're reducing runs.

Sunray Mid-Continent is making a 10% cut amounting to 11,500 bbl. daily. Suntide Refining also cut 11,000 bbl. daily. Continental Oil is trimming 10,000 bbl. daily off its March runs of 172,000 bbl. and has another cut of 9,000 bbl. daily scheduled for May.

R. W. McDowell, president of D-X Sunray Oil Co., the manufacturing arm of Sunray Mid-Continent, said flatly "the refining industry is again facing a crisis of ruinous oversupply."

"Too many people seem to think that the recent import regulation will

Capital Spending . . . Going Up in '59

	1958	1959 Estimate	Changes in outlook since January survey
	(millions of dollars)		
Drilling and Production	4,085	4,600	Up $90 million.
Refining	615	665	Off $23 million.
Transportation	1,230	1,310	Off $203 million.
Marketing	400	450	Up $186 million.
Other	70	60	Up $7 million.
Total	**6,400**	**7,085**	**Up $57 million.**

cure all of the industry's economic ills," he said, warning that the industry actually faces a repetition of 1958's troubles.

McDowell noted that refiners' costs are rising in spite of tight management controls. Wages rose in January, new octane increases are impending, and steel costs likely will go up in midyear. McDowell said this makes it vital that refiners should avoid oversupply which results in declining market value for products.

Prices for products up to now have remained generally firm over the country. But they won't stay healthy long if stocks continue to build up.

The outlook . . . Except for drilling, prospects are excellent in the industry.

Drilling hasn't come up to expectations in the first quarter, but there are signs of better days even in this segment of the industry.

Bad weather has played a role in slowing up drilling activities so far. But the number of active rotary rigs has edged above the 2,000-mark and should climb higher with warm weather near. The poor first-quarter showing means, however, that well completions the rest of the year must average 18 per week higher than normal to reach the announced goal of 52,746 (see charts).

The crude picture also is fair. First-quarter production was 674 million barrels, compared with 623.2 million barrels for the same period last year.

Despite this production gain, crude stocks declined. They now are 253.5 million barrels, compared with 262.7 million barrels in 1958. Record high was 281.8 million barrels in 1957. Part of this crude-stock decline was due to excessive runs. Refiners just moved the material from crude to product tanks.

Spending to rise . . . Companies also have revised upward their budgets for capital spending.

The latest Journal survey shows that companies now plan to spend $7,085,000,000 this year, an increase of $57 million from their January estimates. Capital spending in the industry totaled $6.4 billion last year (see table).

Early reports on first-quarter company earnings also are promising. Wall Street analysts now expect earnings of the international oil companies this year to rise 8 to 10% and those of domestic integrated firms to go up 12 to 15%.

But what actually does happen to earnings very well could be decided within the next few weeks by refiners. The usual chain reaction of rising stocks and depressed prices has started. It will pick up speed fast unless a tighter rein is kept on refinery runs.

watching WASHINGTON

Joe Reilly

• Baffling trifles slow cogs in import machinery . . .

IT TAKES SOME VERY ABLE BUREAUCRATS to enforce the new oil-import program.

Almost every day a question arises to which an unequivocal answer has not yet been set down in black and white. Quite often the answer is supplied by an anonymous bureaucrat.

This is not to imply that the upper echelons of our great bureaucracy were lax in drawing up the program. They tried hard to close every loophole before it developed.

The President's proclamation, which established the quota system, was a masterpiece in legal phraseology. Aided by a staff of lawyers, Interior officials have issued several sets of rules and regulations to enforce the proclamation. The regulations seem to cover just about any circumstance under which petroleum might be imported. But such is not the case.

IMAGINE THE QUANDARY, FOR INSTANCE, of the customs collector at Houston. Twenty-five cases of canned lighter fluid were arriving by ship, apparently in violation of the import controls. He called Interior long-distance.

A man on loan from another bureau answered the phone. He ruled that the shipment should be allowed to enter without quota since Customs does not include lighter fluid among the commodities on which it collects a petroleum tariff.

On the spur of the moment, the visiting bureaucrat established a precedent. His solution may not be strictly legal, but it's simple.

Another Customs man called the other day with a similar problem. A manufacturer of cream separators was including a can of special lubricating oil with each machine shipped in from Canada. He had no import quota for the oil. An alert Interior official, also anonymous, let the shipment in on grounds that it involved domestic oil which had been shipped to Canada and was merely seeking reentry.

A tipster tells of a company whose quota supposedly was cut by 45 gal. Not one barrel, mind you, but 45 gal. It seems that a sample of the oil was brought in ahead of schedule and Washington decided merely to deduct the amount from the company's quota rather than require the sample to be returned to its origin. This report has been denied, however.

SUCH INCIDENTS ARE KNOWN in the world of bureaucracy as "minutiae." A bureaucratic friend translated that for us. It means "not worth piddling with."

The reason for so many minutiae popping up, if we can trust the same source, is that nobody remembered to put a "de minimus" clause in the import proclamation.

That oversight may cause more trouble down the road. Suppose, for instance, that a university wanted to import 5 gal. of Boscan crude for use in laboratory experiments. Assuming the university had no refining capacity, it would not be entitled to a regular crude-oil quota. "Strictly from a legal standpoint, we would have to say no," fretted one bureaucrat.

"But somewhere along the line," he assured us, "something's going to have to be done" about that de minimus clause.

The Oil Import Administration, having a full-time staff of six persons, is just a fledgling in the world of bureaucracy. It has recruited part-time help from three other Interior people, including two attorneys.

The three-man Oil Import Appeals Board, also including one Interior official, already has built up a staff including an executive secretary, a counsel, and two secretaries.

Even under the cooperative arrangement, import controls are expected to boost Interior's budget by about $100,000 next fiscal year. Even on a modest scale, bureaucracy doesn't come cheap.

New Water-Flood Method Successful

- Water is injected at gas-oil contact instead of oil-water contact.

Robert J. Enright
District Editor

A MAJOR new advance in water-flood technology has been developed by Core Laboratories, Inc.

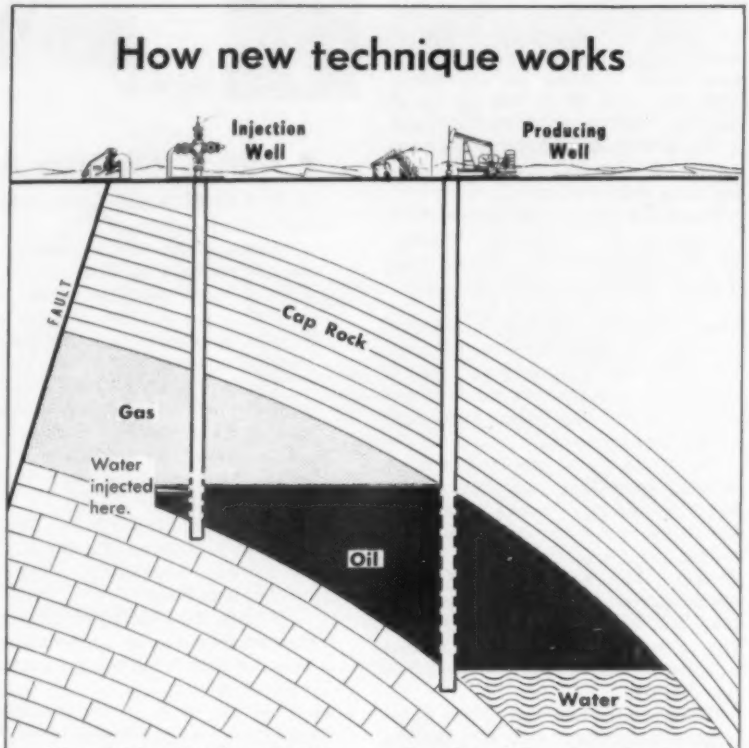
In the new technique, water is injected in a reservoir at the gas-oil contact, rather than the oil-water contact or below as in the conventional method.

The patent (No. 2,842,204) on the process specifies injection at the gas-oil contact in a tilted reservoir near the updip limit of the contact.

In an unusual action, Core Lab last week assigned unrestricted ownership of the patent to a group of oil operators making first use of the method.

Beneficiaries include the 18 operators participating in the Adena J Sand Unit in Morgan County, Colorado. Each was given an equal undivided interest in the patent and full power to use or license its use as it may desire.

The Core Lab assignment was announced at a meeting of the Adena Operators Committee by M. W. Peck, chairman of the committee and manager of the southwestern production division of Pure Oil Co., Tulsa.



Water is injected at the updip limits of the gas-oil contact rather than at the water-oil contact. The water is injected at the same rate oil is produced. This maintains reservoir pressure. The injected water also blocks off the gas zone from the oil zone.

When oil production begins to decline substantially, only produced water is injected and pressure is permitted to drop. The gas cap then begins to expand, pushing water ahead of it through the oil zone. More oil is produced.

When the last recoverable oil is produced, the operator can finish up by producing the gas from the gas cap.

To get more oil . . . The new method has been working exceedingly well so far in the Adena J sand pool—the first reservoir in which it has been attempted. The recovery program was launched in 1957 following a Core Lab engineering study of the field's knotty downdip recovery problems.

The patent on the method was granted July 8, 1958, to W. L. Horner, vice president and manager of Core Lab's engineering and consulting department, who assigned it to Core Lab.

Operators expect use of this technique to boost oil recovery from Adena's J sand by roughly 30,000,000 bbl. over that recoverable by competitive primary production.

Maximum primary take at Adena was fixed at 41,000,000 bbl., by Pure Oil, unit operator. The flood, it estimates, will hike this to 71,000,000 bbl.

The Adena-type project, operator thinks, will cost considerably less than a conventional flood, which would likely recover only about 85% as much added oil.

Past thinking by many engineers, that water injected at the gas-oil contact in a reservoir might channel quickly down into the oil zone through streaks of sand with high gas saturation, has been proved unfounded.

Why method is better . . . In a reservoir such as Adena, the method has several distinct advantages over conventional flooding at or below the oil-water contact. Here are a few:

. . . Injected water blocks off the gas cap from the oil-bearing zone and prevents loss of oil into the cap which occurs as conventional program progress. Oil saving here can amount to several million barrels in a large field (and this is the case at Adena).

. . . Costs are cut in several ways. Operating life of this type of program is shorter, thus producing more oil in less time. Savings would be made through fewer injection and producing wells, which would cut down on equipment requirements.

. . . Some gas escapes from the downdip side of the injection wells before a water seal is forged between the gas cap and the oil.

This gas is driven under pressure ahead of the water and into the oil zone. There it lowers viscosity of the oil so that it flows more readily to the producing wells. The gas also lightens the fluid load in these wells and reduces the amount of lifting work.

Too, the gas saturates the oil sand just ahead of the water front and hikes oil production over that which could be obtained by displacement at the bubble-point pressure.

. . . The flood front is straighter and more easily controlled.

. . . **Gas-cap production** later on can be handled flexibly and with better timing.

Some changes allowed . . . The procedure for injected water can vary if reservoir conditions warrant a change, the patent holds.

For instance, in some fields it might be found better to inject above the gas-oil contact so as to more nearly fill the gas cap with water. In others, the situation might dictate injecting some distance below the updip limit of the contact.

The general technique, the patent claims, works just as well in pools with secondary-gas caps (formed when reservoir pressure falls below the bubble point and gas comes out of solution with the oil) as in those with primary caps.

Offshore Sale Set

. . . by Interior for acreage on Florida's outer shelf.

THE federal Government will offer oil and gas leases on approximately 458,000 acres of submerged lands off the coast of Florida May 26.

Bids will be accepted for 80 tracts in the Marquesas area off the Florida Keys.

The sale is to be the first federal auction of mineral leases on the outer Continental Shelf since July 1955. It is the first offering of submerged lands held by the federal Government in the Florida Keys area.

Edward Woozley, director of the Interior Department's Bureau of Land Management, has scheduled the opening of bids for 10 a.m. in the Claiborne Room, St. Charles Hotel, New Orleans.

The Bureau of Land Management last November invited nominations for blocks to be offered for leasing. At that time, the Supreme Court was expected to rule on the federal-state boundary in the Gulf of Mexico before the sale. Since then, the court has delayed its ruling until the fall term.

An Interior spokesman said the area to be leased is not involved in the boundary dispute.

The federal Government's last scheduled sale of outer Continental Shelf leases was canceled in 1956 because of a suit filed in federal court by Louisiana.

The four previous sales of outer Continental Shelf leases by the Bureau of Land Management have brought the Government more than $300 million in rents and bonuses.

Tidewater and Skelly Merging

. . . into a billion-plus integrated company. It will take months to complete, but studies already are under way.

SKELLY OIL CO. and Tidewater Oil Co. will be merged before the year is out into an oil giant with assets exceeding a billion dollars.

Officials of the two firms, long reluctant to discuss the matter, broke silence last week, confirmed the merger rumors, and disclosed that:

. . . **Surveys are presently being** made of company properties, plants, and other assets looking to the possibility of merger.

. . . **Conferences** between Skelly and Tidewater officials have been held in Dallas. Others are planned soon to iron out a basis for the consolidation.

. . . **From 4 to 8 months** at least will be required to complete the financial and legal requirements.

Officials talk . . . Tidewater President George F. Getty II told the Journal the merger is being negotiated.

He added that his advisers think it will take 4 to 8 months to complete details and clear the matter with Department of Justice officials.

Skelly President John S. Freeman first took official notice of the increasing rumors that the two firms were about to merge. He said:

"Over a period of many years, from time to time, the two companies have considered the possibility of a merger, and such consideration is presently being given.

"However, at this time, it is not possible to predict whether, or at what time, any such merger will occur or the basis upon which the same might be consummated, if at all."

Dream of Getty . . . There's little doubt in oil circles, however, that the merger will succeed, providing any antitrust objections by the Government are overcome.

Such a merger has long been the desire of oil billionaire J. Paul Getty, father of the Tidewater president and owner of controlling interests in both firms.

Getty conducts his far-flung interests from his apartments in London and Paris. Last week he declined to comment on the merger report when interviewed in Paris by Journal International Editor Paul Swain.

Getty controls both Tidewater and Skelly through a complex arrangement also involving Mission Corp., Mission Development Co., and Getty Oil.

Getty Oil owns 58.55% of Mission Development and 47.16% of Mission Corp. In turn, Mission Development holds 47.62% of Tidewater, Mission Corp. 3.47%, and Getty Oil another 14.31%. Mission Corp. also owns 59.38% of Skelly.

The merger might have been accomplished years ago except for the objections of the late W. G. Skelly who had built the Skelly firm into a big integrated independent company.

Tidewater assets total $810,731,000. Gross revenue last year was $552,944,000, and net was $2,616,000. Its net was down sharply from 1957 earnings of $34,937,000.

Skelly has assets of $380,080,240, gross revenue last year of $255,661,230, and a net of $27,686,553 compared with net of $36,785,340 in 1957.

Big Utility Buys Alberta Gas

SASKATCHEWAN Power Corp. will pay more than $25,000,000 for all the gas reserves in Many Islands field in southeastern Alberta.

The company has agreed to pay $15,200,000 to Crescent Petroleum Corp. for its interest in the field, and a reported $10,000,000 to Britalta Petroleums, Ltd., for its interest.

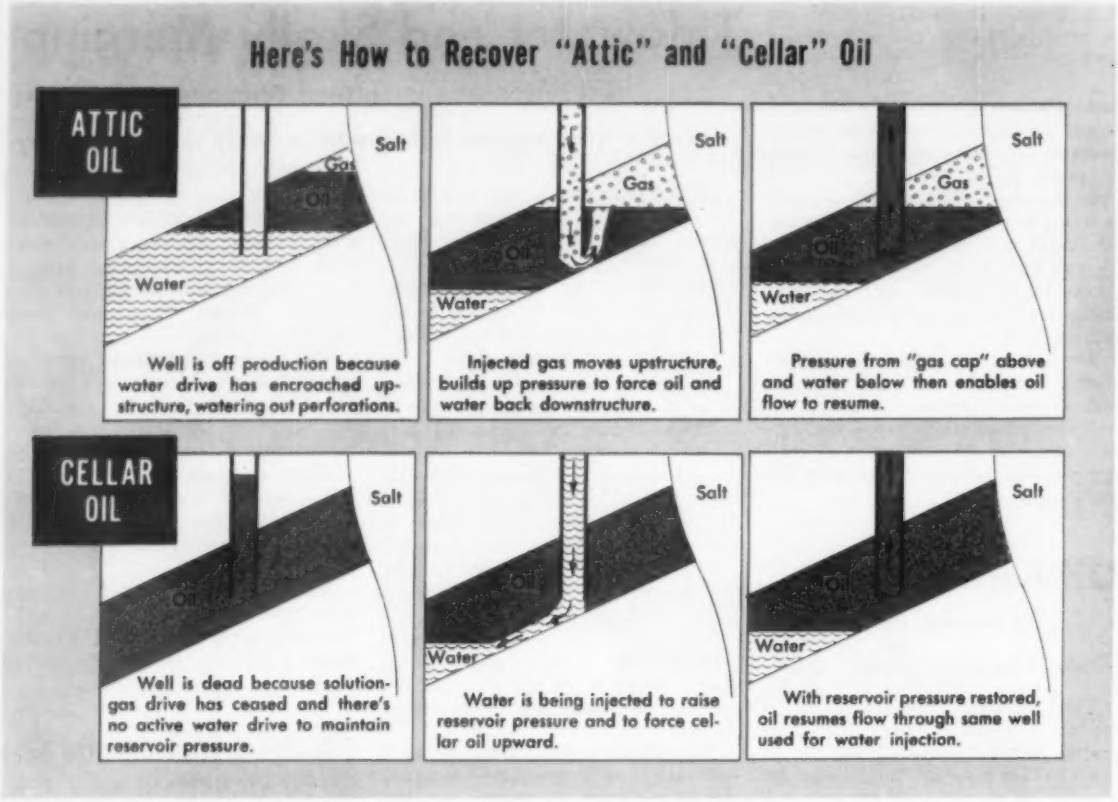
This is the first time that a company owned and operated by a Canadian province has contracted to purchase gas properties in another province. The deal involves an estimated 800 billion cubic feet of reserves on 153,000 acres. Crescent and Britalta discovered the field in 1951.

Blast Costs Estimated

THE COST OF OIL which could be produced by an underground nuclear blast in western Colorado's oil shale area is estimated at $2 to $3 per barrel.

C. C. Anderson, chief petroleum engineer for the U. S. Bureau of Mines, says a 300-kiloton device exploded 3,000 ft. underground would break up 35 million tons of shale.

He believes 47% of the shale would be suitable for oil recovery by in situ combustion. Shale bearing 28 bbl. per ton would yield 3,000 bbl. daily or 11 million barrels in a 10-year period. Capital costs would run from $4,730,000 to $6,170,000.


Here's How to Recover "Attic" and "Cellar" Oil
ATTIC OIL
Salt
Gas
Oil
Water
Well is off production because water drive has encroached upstructure, watering out perforations.
Injected gas moves upstructure, builds up pressure to force oil and water back downstructure.
Pressure from "gas cap" above and water below then enables oil flow to resume.
CELLAR OIL
Well is dead because solution-gas drive has ceased and there's no active water drive to maintain reservoir pressure.
Water is being injected to raise reservoir pressure and to force cellar oil upward.
With reservoir pressure restored, oil resumes flow through same well used for water injection.

Left-Over Oil "Rescued" on Gulf Coast

• Several companies already are at work recovering "attic" oil, and Humble now has a permit to attempt the world's first "cellar" oil recovery project. Behind the new techniques: A lot of extra oil at low cost.

Ed McGhee
Drilling Editor

GULF COAST producers are taking another look at their producing fields with bright hopes for adding a lot of oil reserves at very low cost.

They are looking for fields where, without drilling any new wells, they may be able to recover oil which otherwise would be left behind. This oil is in two categories:

. . . **"Attic" oil,** which is above the highest upstructure well in fields with an active water drive.

. . . **"Cellar" oil,** which is below the lowest downstructure well in fields with a weak water drive or none at all.

Producers think that in many Gulf Coast fields the attic oil can be recovered by injecting gas downdip. The injected gas rises to the crest of the structure by gravity segregation. In doing so, it displaces the upstructure oil, forcing it back down around the lower wells where it can be produced.

The cellar oil is to be recovered by injecting heavy salt water into the lowest well. The water should gravitate downdip to the lowest limits of the reservoir where it will displace the oil. This forces the oil upwards toward producing wells.

Problems ahead . . . Recovery of attic and cellar oil won't be easy in many cases.

First, the flanks of the long-known piercement domes have been riddled with holes on which there are few, if any, records. Moreover, most old wells have been perforated and squeezed many times during completions. As a result, it could be quite expensive to prepare the reservoir and the injection well for operation. Injection wells must be capable of withstanding high injection pressures without leakage or communication with other zones.

One producer has said that his company considered buying up old salt-dome leases to recover whatever cellar and attic oil that might have been left behind. After thinking about the poor well and reservoir control, he decided to proceed slowly and investigate his present leases first.

There could be other problems that have nothing to do with the mechanics of operation.

Some producers are fearful that oil-regulatory bodies might be insistent on new-well drilling in many cases. Moreover, where oil had to flow underground across a lease line, unitization would be necessary.

In such unit operations it would be very difficult to assign participation factors to the various lessees. Too little is usually known about the shape of the reservoir in its boundary areas.

It works . . . There have been several

very successful attic-oil recovery experiments.

The first was started back in 1950 by Stanolind Oil & Gas, now Pan American Petroleum Corp., in West Hackberry field in Cameron Parish, Louisiana.

Since that time, Humble Oil & Refining Co. and Tidewater Oil Co. have carried out profitable attic-oil trials elsewhere in South Louisiana. These same operators plan a dozen or more similar projects. Other companies, seeing the good results of the experiments, are eager to try projects of their own.

The idea for recovering cellar oil is newer. According to reports in the industry, there has been at least one successful experiment in South Louisiana. The operator, however, has made public none of the details of the project. No one else is known to have ever set out intentionally to recover oil that is structurally lower than the water-injection well.

But, at least two cellar-oil projects should get under way soon. Humble already has authorization from Louisiana's Department of Conservation to conduct a cellar-oil operation offshore from Grand Isle, La. Tidewater is actively studying the cellar-oil method and is expected to announce a project soon.

The Grand Isle cellar-oil project of Humble is in the same field where the company conducted the second attic-oil-recovery project on record. This was a one-well operation started in 1955. Humble now has authorization for several more attic-oil programs in the field.

No new-well cost . . . Recovery by injection and gravity separation has a strong appeal to oil producers because it can be quite cheap in comparison with some of its alternatives.

In the past, if the producer thought there was enough oil in the "attic" or "cellar" to justify it, he drilled a new well. There are two big objections to drilling a new well to get such oil.

First, the well itself is expensive. Second, it's next to impossible to spot the well so that it will be in position to produce all—or most—of the recoverable attic or cellar oil.

Geology around salt domes is usually too complex to know beforehand where the updip or downdip limit of the reservoir actually is.

Most wells on the flanks of Gulf Coast salt domes have several pays. So, if the well waters out in one zone, it can be recompleted in another. This fact has spelled death for many attic-oil and cellar-oil projects in the past. It often proved cheaper to recomplete the well in another zone than to work it over for injection service.

How Much Oil Will Be Recovered?

The attics and cellars of present oil fields contain a bonanza of "extra" oil.

It's impossible to estimate very closely just how much of this oil eventually will be squeezed out through use of the two recovery techniques.

However, one prominent engineer estimates that the figure might run as high as 15% to 20% of the total ultimate recovery from Gulf Coast salt domes alone.

If so, this could mean a half-billion barrels or more of extra oil in this one area. Added to this total would be a significant amount from the sides of steeply-dipping anticlines in other parts of the world.

While producers dislike drilling new wells to get attic or cellar oil, they still don't want to leave it unrecovered. Such oil is a reserve whose location they know and for which surface equipment has already been bought. Too, there is already an assured market.

Two examples . . . It had always troubled reservoir engineers that they had no means but primary recovery to get oil out of pool too small for more than one well.

At Grand Isle, Humble used the same well for both injection and production. This well, the only one completed in the reservoir, had gone almost completely to water. Gas injection was started through the well, pushing oil down out of the attic and the water back down into the cellar.

For this reason, some view the attic and cellar-recovery methods as "the solution to the one-well-reservoir problem" since the same well may be used for injection and for production.

After a period of injection, the well was switched back on production for a time. It produced oil with a normal gas-oil ratio and with very little water.

After several months of production, the well was put back to gas injection. This cycle of alternate injection and production was to be continued to depletion of the reservoir.

On each injection cycle, care is taken to make sure that the oil is not forced down as low as the original oil-water contact. Much of the oil which might be forced into the water-wet formation below the original oil level would be lost.

In Venice field of Plaquemines Parish, Louisiana, Tidewater followed a similar one-well program. After cycles of gas injection, the well produced water-free and with a low gas-oil ratio. The company has laid plans for a second project of this kind in the same field.

Bigger pools, too . . . Engineers point out two other facts. First, the attic and cellar methods solve the one-well-reservoir problem only for steeply-dipping beds. And, second, attic and cellar projects can pay off handsomely in multi-well reservoirs as well.

In fact, the biggest attic-oil program to date was in Pan American's Hackberry field where 18 wells could produce the reservoir. The company drilled no new wells but began injecting gas into a well high on structure. At the same time, wells lower on structure continued producing oil.

Periodically, Pan American stopped gas injection and flowed the well back. As long as the well flowed back oil with a low gas-oil ratio, the company knew that the artificially-created gas cap had not yet crept down as far as the injection well.

When, after 5 years, the well flowed back only gas, the company knew all oil had been forced out of the attic above the injection well. Then, the gas was diverted to another reservoir.

What to inject . . . Recovering attic or cellar oil is a matter of replacing the oil with something else which must be left behind in its stead.

Naturally, it's wisest to use the cheapest injection available. But, there's often a big question about what will be cheapest.

In all attic-oil projects to date, gas has been used. In each case, presumably, a cubic foot of oil drained from the attic was much more valuable than the cubic foot of gas sacrificed. At Venice, where it was buying gas at 8 cents per M.c.f. and injecting it at 3,300 psi., Tidewater figured each $1 worth of gas brought back $20 worth of oil.

With little gas for sale at 8 cents per M.c.f. and many reservoirs requiring pressures higher than 3,300 psi., gas may be too valuable to use in many future cases. In these, some engi-

neers expect that nitrogen (generated by burning small quantities of natural gas) will be used instead.

Key to the problem is gravity. In a typical case, specific gravity of reservoir gas might be only 0.15, compared to 1.0 for water. Oil in the same reservoir might have a gravity of 0.8. The difference between the 0.15 and 0.8 gravities causes the gas and oil to separate quickly.

The problem is different with cellar-oil projects. Oil with an 0.8 gravity would separate slowly from a fresh water at 1.0. On the other hand, many oil-field brines have a gravity of 1.25, and solutions of calcium chloride can be weighted up to 1.5 or more. As water gravity increases, so would the speed of separation, and the time of separation has a direct bearing on payout.

For instance, if fresh water is used, an operator might have to close in his injection well for many months while the oil and water separate.

Using a heavy brine would enable him to flow back his injection well quicker without producing too much water. And, if the operator can figure the payout of buying heavy solutions of calcium chloride, his shut-in time would be even shorter and his production would start sooner.

Humble's cellar project . . . Humble has picked a reservoir which seems ideally suited to both the physical and financial limitations of recovering cellar oil by water injection.

The pool has only one completed well and it is already dead; the reservoir dips at 60° which is steep enough to speed gravity separation of the reservoir oil and the injected water; there is a lot of oil at stake; and drilling a new well would be quite expensive.

The history-making project is scheduled for the Q-2 reservoir of the D-4 sand under the company's State Lease 797 in Block 18 of the Grand Isle offshore area. The single well—the J-2—is directionally drilled from a platform. With the great expense of one such offshore well behind him, no operator wants to drill a new one when it can be avoided.

The J-2 has a net oil saturation of 102 ft., but the Q-2 reservoir covers only 10.9 acres. Humble engineers estimate that the pool originally contained 1,306,000 bbl. of oil. Thus far, the J-2 well has produced only 21,500 bbl., or 1.6% of the total. By injecting water into the J-2, Humble hopes to be able to recover another 283,000 bbl. of oil at reasonable investment and with reasonable payout.

The reservoir is bounded on the sides by radial faults off the big Grand Isle salt dome. The salt plug itself limits the pool at its crest; at the bottom, the reservoir is sealed with little, if any, water drive. The J-2 well was completed in January 1957 and died in April 1958 after making only 21,500 bbl. of oil and 13,353 M.c.f. of gas. Humble opened up more perforations in the same sand, but the well still would not flow.

Original bottom-hole pressure of the D-4 sand is unknown. However, a survey run after the well died showed 3,218 psi., about 1,600 psi. less than would be expected in an unproduced reservoir at the Q-2's depth of 10,400 ft. This shows that the reservoir is sealed and no help could ever be expected from a natural water drive.

Humble expects to use the same well for water injection and then oil production. The injected water—treated sea water—should migrate downstructure and away from the well. Then, when injection ceases, the well will be closed in until it will flow back oil with a reasonably small amount of water. Allowable for the well is to be accumulated during the time water is being injected. Then, when the well is returned to production, this amount of oil can be produced over the normal allowable.

Other projects ready . . . The cellar-oil recovery projects are not the only plans Humble has at Grand Isle.

Up to March 1958 the company had approval for three attic-gas projects and at least two of these are still under way. Moreover, it got approval only last month on a combination project.

In this project, water is to be injected in the lower of two wells in a 20-acre reservoir. Since the oil-water contact is already at the level of the injection well, there will be no recovery from the cellar because of the injected water. Oil will be produced from the upper well until the oil-water contact arrives at that level. Then, gas will be injected to recover the oil left in the attic above the second well.

In this reservoir, Humble expects to recover an additional 132,000 bbl. of oil, 40,000 of which will be attic oil.

Pan American last year got approval of the Texas Railroad Commission to carry out five separate attic-oil-recovery projects at High Island off the Texas coast (OGJ, Oct. 20, 1958, p. 52). These projects are expected to mean about 500,000 bbl. of extra oil. Injection should begin as soon as a suitable gas supply has been arranged.

Wells Put on 160-Acre Spacing

. . . in West Perryton field of Texas Panhandle. It's only third area in state ever to be given such wide spacing.

THE TEXAS Railroad Commission has approved 160-acre spacing for oil wells in West Perryton field, Ochiltree County, Texas Panhandle.

West Perryton, which produces from the Morrow at 8,100 ft., thus becomes the third oil field in Texas history to go to such wide spacing.

The first was Spraberry Trend Area field several years ago. The second, Dune Wolfcamp field in West Texas, was the subject of a rare dissent by one of the commission's three members, Olin Culberson.

Culberson strongly criticized the Dune order in his dissent as opening the door to future squelching of drilling on small tracts (OGJ, Jan. 26, p. 106). No such small tracts exist in Dune field. But, Culberson said, the order could and would be used "by large operators in the future as the vehicle to freeze out the owner of the small tract who does not see fit to yield to high pressure to unitize his property."

Acreage factor . . . Culberson, for the same reasons, also took a hefty swat at basing allowables solely on acreage, maintaining that the well should be a substantial factor.

Operators in West Perryton also sought an allocation formula based 100% on acreage. The commission, however, didn't go along—establishing a formula based 75% on acreage and 25% on the well instead.

The West Perryton order is regarded as significant indication that the commission, though willing to go along with wider spacing where justified, will continue to be reluctant to base allowables on acreage alone.

The wide spacing application in the field was filed by Sun Oil Co. and was supported by Humble Oil & Refining Co. and Sunray Mid-Continent Oil Co. It was not opposed.

West Perryton is a small field with just four completed wells. It is an elongated lens trending northwest-southeast and is defined on the north, west, and southwest. Fully developed, Sun says, it likely will take in only about 2,000 acres.

FIRST IMPORTS APPEAL is made by Joel Wolfson, attorney for Whale Oil Co., standing, with Board Chairman Royce Hardy, left center, and Member Carl F. Oechsle, right center, listening.

Temporary Import Relief Is Proposed

THE OIL Import Appeals Board, in its first public hearing, received a plea for a "loan" against future import quotas.

If approved by the board, the proposal may clear the way for relieving many individual hardships under mandatory import controls without wrecking the program.

The plan was offered by Joseph Schwartz, head of Whale Oil Co., New York.

The company appealed for a special quota to permit the entry of two cargoes of Middle East residual, totaling 240,000 bbl. Under its regular quota, Whale Oil can bring in only 301 bbl. daily.

Unusual case . . . In its appeal, the company pointed out that it contracted for purchase of the oil in January, long before the new import controls were announced.

After receiving its quota, the company claimed, it was too late to cancel the contract.

As the appeal was heard, the two tankers were "at the gateway of New York Harbor." They were expected to arrive late last week. If not allowed to unload the cargoes, the importer stands to lose about $3,000 a day while the tankers are tied up in port.

The pitch for an advance from future allocations was made as the board was concluding its first public meeting. Royce A. Hardy, assistant Secretary of the Interior and chairman of the appeals board, indicated an early decision may be expected. He noted, though, that interested parties are allowed 7 days in which to file written statements in the case.

Quota right upheld . . . The board's first ruling upheld a Puerto Rican chemical company's right to a crude-oil quota.

Gonzales Chemical Industries, Inc., had been denied a quota on grounds that it had no refinery capacity. The company estimated its requirements of Venezuelan crude oil at 736 bbl. per day during the second quarter to operate its $14,800,000 plant at scheduled capacity.

The board decided that Gonzales should be given a crude-oil quota as though it had qualified as a refiner. In the base period of 1958, the company imported about 76,000 bbl. of crude for its fertilizer plant.

More than 50 appeals by almost as many companies still awaited action by the board. Many of the companies are seeking hearings before the board so they can elaborate on their appeals.

It's a foregone conclusion that not many of the larger requests will be granted. Under the import-control formula proclaimed by the President last month, the ceiling on total oil imports into the United States is set at about 1,400,000 bbl. daily.

If granted, appeals already before the board would boost present quotas more than 300,000 bbl. daily.

Nearly a third of all companies receiving quotas have appealed for special consideration from the board. In addition, several companies have appealed after being denied allocations.

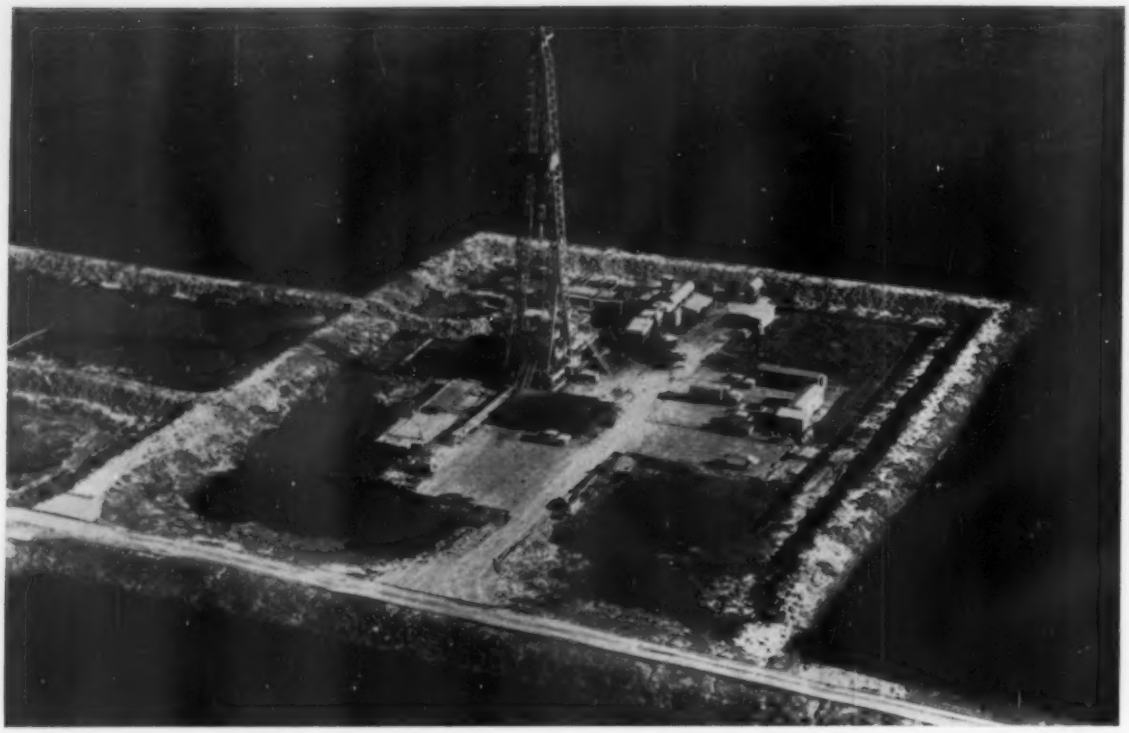
The appeals board is expected to make quick work of cases attacking the President's proclamation or the rules laid down by the Oil Import Administration. The board has indicated it will not consider any such appeals.

Special appeals . . . Two major companies contend the import regulations fail to give them the protection to which they are entitled under the "20% formula."

This provided that no company's quota for crude and unfinished products would be cut immediately more than 20% below its quota under the voluntary import program.

When quotas were issued, it developed that several major importers were cut more than 20%. In such cases, the formula for setting quotas on crude and unfinished oils combined was based on 80% of the former quotas for crude oil alone.

Standard Oil Co. of Indiana and Socony Mobil Oil Co., Inc., both raised this point in their appeal. Standard Oil Co. (N.J.) is seeking individual quotas for subsidiaries. Tidewater Oil Co. is appealing because of "hardship, inequitable treatment, and special considerations."



Tidewater Hits on High-Pressure Test

• Unusual Louisiana well has shut-in tubing pressure of 11,690 psi., a possible record. The discovery was brought in after high pressures forced abandonment of the first test.

LOUISIANA'S marshes again have produced what may be the highest wellhead pressure ever recorded.

Tidewater Oil Co. has brought in a major gas-condensate discovery with a shut-in tubing pressure of 11,690 psi.

This tops the 11,600 psi. recorded in 1957 on a Union Oil & Gas Corp. well in the same South Louisiana area (OGJ, Feb. 11, 1957, p. 66).

The Tidewater well is the 2 Lacassane, about 10 miles southwest of Lake Arthur, La., in Cameron Parish, in Section 21-12s-5w. Nearest production is Chalkley field 4 miles to the west and South Thornwell field, 5 miles to the northeast.

On a ⅛-in. choke it flowed at the rate of 2.6 million cubic feet of gas daily with 87.5 bbl. of 48.2°-gravity condensate per million through perforations at 16,112-30 ft. in the Miocene.

The well found the deepest Camerina sand production ever encountered.

Pressure . . . The tremendous pressure was handled without major difficulty. But an earlier experience served the company well in the completion.

On the first test at the location, the 1 Lacassane had to be abandoned below 16,000 ft. when unexpected high pressures kicked the kelly out of the hole, and ruptured the casing in several places. The drill pipe collapsed, and several months of fishing failed to clear the hole.

Tidewater plugged the well and moved the rig 360 ft. north for the 2 Lacassane test.

Knowing the pressure problem, Tidewater took special precautions. One blowout preventer was a Cameron Type F with 15,000 psi. working pressure and 22,500 psi. test pressure. A second was a conventional 5,000 psi. working pressure and 10,000 psi. test pressure.

As further insurance, Tidewater had a choke manifold of 15,000 psi. working pressure.

"We had no trouble at all controlling it," said a Tidewater spokesman. "We knew the pressure was there, and we respected it."

Bottom-hole pressure is close to 15,000 psi. This estimate is based on the fact that the well kicked an 18-lb. mud out the drillpipe.

Mud and casing . . . The company used an 18.5-lb.-per-gal. mud. For completion it used a special completion fluid also weighted up to 18.5 lb.

For the two wells the mud bill, alone, ran to some $500,000.

The casing program called for P-110 pipe and consisted of 20-in. to 520 ft., 13⅜-in. to 4,643 ft., 9⅝-in. to 12,561 ft., and 7-in. to 15,497 ft.

A 4½-in. liner stretches from 15,365 to 16,175 ft. It has a minimum yield of 14,420 psi.

Special P-105 tubing of 2⅞-in. o.d. was used to give a minimum yield greater than 25,000 psi. The thicker-walled tubing weighs 11.65 lb. per foot.

The area . . . Drilling the 2 Lacassane was accomplished under most adverse conditions.

The lease is in a U.S. Wildlife Service refuge, where water stands 1 to 4 ft. deep and dredging is prohibited. Levees had to be created at the drillsite (photo) and a board-topped road and a 105-ft. bridge built.

To prevent pollution, Tidewater had to drill a disposal well.

Spudding took place last November 18. The 1 Lacassane was spudded last June 4.

The outlay . . . Tidewater has 20,000 acres and intends to develop fully the new field. It plans to move the rig quickly to a new location about 1 mile to the northwest.

So far, Tidewater has spent nearly $2 million finding production. This includes the cost of drilling both the deep wells.

Clegg & Hunt, drilling contractors, are in charge of drilling operations.

Overseeing the operation for Tidewater are J. A. Smotherman, South Louisiana district superintendent, and H. T. Odom, area superintendent, both of Lafayette.

Big New Mexico Spread Sold

. . . by Humble in unusual deal with Dallas firm involving 40,000 acres, 41 gas producers in San Juan basin.

IN ONE of the year's most unusual deals so far, Humble Oil & Refining Co. last week revealed it has agreed to sell 40,000 acres of producing leases on Indian lands in Northwest New Mexico to Arizona Explorations, Inc., Dallas independent.

The agreement covers 16 oil and gas leases on the Jicarilla Apache Reservation. The leases, relatively contiguous in large blocks, are in Townships 22n through 25n and Ranges 4w and 5w, in Rio Arriba and Sandoval counties on the southeast side of the San Juan basin. Center of the spread is about 20 miles northwest of the community of Cuba.

Humble had completed and is now producing 41 gas wells and 2 oil wells on the acreage. The wells produce from the Pictured Cliffs, Mesaverde, and Dakota zones and are in Tapacito, South Blanco, and Otero fields.

About 90% of the gas production comes from the Pictured Cliffs formation, according to a spokesman for Arizona Explorations in Dallas. And the majority of the wells are in South Blanco and Tapacito fields.

The gas production is purchased by Southern Union Gas Co. and consumed entirely in New Mexico.

Other than saying briefly what was sold and to whom, Humble is declining comment on reasons for the sale or specific terms. Rex Corey, vice president of Arizona Explorations, confirmed to the Journal that Humble retains an override. Payment to Humble will be partly in cash and partly in payments from production.

The deal obligates Arizona Explorations, Corey said, to develop the acreage steadily, drilling at least six wells a year.

Though the deal has essentially already been consummated, it will require the official sanction of Interior Department's Bureau of Indian Affairs. Corey indicated, however, that this amounts to a routine assignment of operating rights.

Why the deal? . . . There is considerable speculation as to why Humble is disposing of such a large spread of proved and semiproved acreage.

One being offered is that the company is merely consolidating its producing interests, and the acreage involved in the sale didn't fit its desired picture.

Another, stemming from reports that Humble still hasn't committed any of its huge gas reserves for sale in interstate commerce due to its reluctance to submit to federal dictation, would have Humble starting to get rid of some of its gas properties.

This is discounted, however, in that the production turned to Arizona Explorations already has an intrastate outlet.

Arizona Explorations, Corey told the Journal, was one of about a dozen firms which bid to buy the leases.

Terms were spelled out as to amount of override, required development, and other items, leaving open only the amount of the cash bonus.

PIPELINE BRIEFS . . .

A 68-mile 12-in. crude line is being built in northwestern Colombia from Cicuco field to Covenas on the Caribbean. The line, owned by Socony Mobil and Texaco, will have initial capacity of 36,000 bbl. per day when it starts operating this spring. It will open a field which was discovered in 1956.

Contract to take up, recondition, and relay 91 miles of products line for Plantation Pipe Line has been awarded to Latex Construction Co. of Georgia. Latex will recondition and apply a new protective coating to 46 miles of 4-in., 38 miles of 10-in., and 7 miles of 12-in. in Georgia.

A 53-mile 30-in. line will be laid by Williams Brothers Co., Tulsa, for Michigan Consolidated Gas. This is the biggest project in the company's $34-million budget for 1959. The line will run from near Milford to Elsie, Mich., paralleling two 24-in. lines serving Detroit.

British Columbia's first crude-gathering pipelines have been proposed in applications to the provincial government. They would serve Milligan Creek, Boundary Lake, and Beatton River fields in the northeast. Peace River Oil Pipe Line Co., Ltd., plans a 220-mile 8-in. line from the producing area to Dawson Creek, B. C., and Grande Prairie, Alta., refineries, and thence to Peace River's existing line at Sturgeon Lake, feeding the Trans Mountain system. Gibson Crude Oil Purchasing Co., Ltd., proposes a 170-mile line from Milligan Creek to Grande Prairie.

Magnolia Pipe Line Co. last week completed and placed in operation a new 267-mile, 19-channel microwave system to handle voice communications between its headquarters at Dallas and the huge refining center at Beaumont, Tex.

The system, which cost roughly $400,000, also will be used for remote control of pump stations at Grapeland, Groveton, and Bragg, Tex., on the company's 20-in. crude line between Corsicana and Beaumont.

Motorola Communications & Electronics, Inc., Chicago, was prime contractor for equipment and installation.

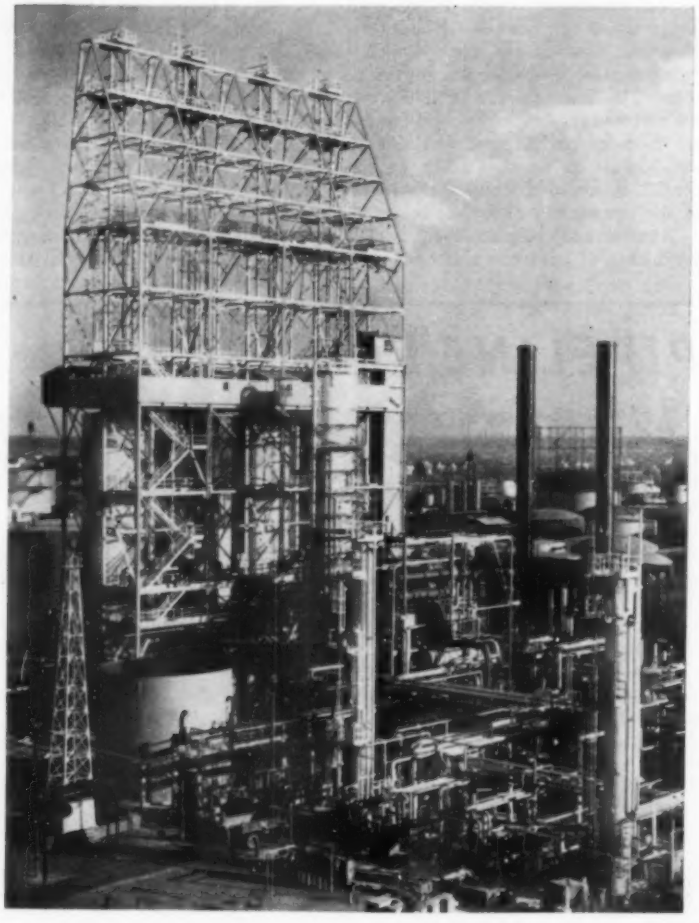
Field engineering and right-of-way acquisition for the 350-mile 30-in. line of Midwestern Gas Transmission, a Tennessee Gas affiliate, has been awarded to Bechtel Corp., San Francisco. The line will extend from Tennessee's main line at Portland, Tenn., to Joliet, Ill.

PHOTOS IN THE NEWS

Wreath Honors Drake ↑

The 140th anniversary of the birth of Col. Edwin L. Drake was observed in Titusville with a ceremony in Woodlawn Cemetery.

Miss Genevieve Blatt, Pennsylvania secretary of internal affairs, is shown addressing the crowd before placing a wreath of Easter lilies at the foot of the grave of the man who brought in the world's first commercial oil well 100 years ago. Drake, she said, "was a man of simple tastes who never made much money, never expected much." He was simply an "ex-railroad conductor who was looking for, and found, a way to drill for oil."



Record Coker on Stream →

Now on its first run is this 19,000-bbl. delayed coking unit at the Paulsboro, N. J., refinery of Mobil Oil Co.

Some may be bigger now, but the Paulsboro unit has the biggest initial capacity ever built into such a unit. It consists of four coke drums 19 ft. in diameter and 63 ft. high. It will produce 764 tons of coke per day. Feed stock is a mixture of seven reduced crudes or blends of residual with gravity ranging from 3° to 14°. The unit was built by Lummus Co.

Kermac Dedicates Biggest Mill

The nation's largest uranium ore concentrator mill was formally opened April 16 by Kermac Nuclear Fuels Corp. The big plant began operation November 28 with a rated capacity of 3,630 tons of ore per day. The mill uses an acid leach, solvent-extraction process developed by Kerr-McGee Oil Industries, Inc.

It's a Real Gasser in Chacahoula

You wouldn't guess, but this is an old well coming back to life. It's Sun Oil Co.'s Lyric Realty and Parking No. 1 in Chacahoula field, South Louisiana. It was being reworked when pressure built up, and sand-carrying gas cut out the christmas tree valves. Gas and distillate were blowing 300 ft. high when this photo was made. The wild well was one of three out of control last week in southern Louisiana.

Lawn Mowers

Spring always brings a problem for refiners—keeping the grass down on the dikes around storage tanks. Tidewater is solving the problem at its Delaware refinery with sheep. The animals needed pasture, Tidewater needed grass clippers. The deal was simple.

Oil Is Tax Target

. . . again in Texas. New bill rejects Daniel's plans.

IT NOW APPEARS virtually certain that the Texas petroleum industry will be tapped again to furnish a share of new revenue needed by the state to wipe out a big budget deficit and to finance new spending.

Just who in the industry will get hit this time and for how much aren't yet clear. But there are indications that the battle of words is about over and answers will be forthcoming soon.

Last week, the house committee on revenue and taxation finally sent to the house an omnibus tax bill which for all practical purposes ignored the revenue-raising program proposed by Gov. Price Daniel.

The bill would raise revenues an estimated $151,688,000 a year, making it the largest in Texas history.

Tax proposals . . . Along with new selective sales and other taxes, the bill would hike the gas production tax to 8% of value from the present 7%. Texas gas producers would thereby be hit for another $6,000,000 annually. The bill also would raise $4,100,000 by eliminating 25% of the rebate on gasoline taxes now given nonhighway users, plus another $5,900,000 with a 2-cent-per-quart tax on lube oils.

It also levies a 35% increase in the corporation franchise tax—a move which would bring in an added $13,300,000.

On the other hand, the bill would rescind the present severance tax on sulfur production, for a loss of $800,000 annually.

Daniel ignored . . . The tax bill, which now goes to the house, discards most of Daniel's pet tax plans, including his 3% "severance beneficiary" tax on production of gas reserves dedicated under contract. This was the major revenue raiser in Daniel's program.

The fact that the Texas attorney general a few days earlier had held that the dedication tax would not violate either the U.S. or Texas constitutions had no apparent effect on the committee's action.

Bakersfield Drilling Halts

ONE OF California's largest one-company townlot lease plays is over. Union Oil Co. of California said last week it is quitclaiming the more than 5,200 leases it signed up in Bakersfield 2 years ago. The decision to call it all off was made after four dry holes.

Object of the $2 million-plus project was the Stevens sand, productive in nearby oil fields. The thousands of leases covered more than 2,500 acres in residential areas of west and south Bakersfield.

Two dry holes were first drilled on the south part of town leases just north of the small Union Avenue field. The second two were drilled on the west leases, which bordered the east edge of the Fruitvale field.

"We regretfully conclude that the area is incapable of producing in paying quantities," Union announced to the 5,200 property owners in turning back the leases.

Texaco Bucks Colorado Tax

A SIXTH COURT protest is being made against Colorado's so-called severance tax on oil and gas production.

The latest challenge, filed in Denver District Court by The Texas Co., contends the tax is unconstitutional and asks a refund of $257,936 paid in such taxes in 1953.

Texaco claims the levy, actually a gross income tax graduated from 2% to 5% depending on amount of production, denies the equal protection clause of the U. S. Constitution.

The industry is awaiting a Colorado Supreme Court decision on a California Co. appeal of a Denver District Court ruling that the tax is legal. Calco also contended the tax violates the state and federal constitutions and demanded a refund of $953,402.

Similar suits were filed by Sinclair Oil & Gas Co., Stanolind Oil & Gas Co., Continental Oil Co., and Union Pacific Railroad. The State of Colorado is vitally interested in the appeal, too, for if the Supreme Court reverses the lower court, the state would face the task of refunding more than $19 million collected since the tax was first imposed in 1953.

the JOURNAL *said . . . . . .*

50 years ago

April 20, 1909

Baton Rouge wins over New Orleans as the site for the $2,000,000 refinery to be built in Louisiana by the newly formed Standard Oil Co. of Louisiana. Rumors are that Standard will lay a pipeline from Oklahoma to Baton Rouge as there is no field in Louisiana large enough to supply a refinery of this size. The only alternative is to bring Oklahoma and Texas oil in by boat from Texas ports.

Mid-Continent Oil & Gas Association chooses Tulsa for its central offices but will open branch offices at Muskogee, Bartlesville, and Nowata.

The Texas Co. adopts a new oil-purchase plan in which it will make monthly contracts with operators on the basis of 30 cents a barrel for fresh oil.

If new oil territory is not developed soon in the Gulf Coast Region, the question of local supply will be a serious one. Oklahoma may be called upon for additional crude to make up the shortage.

25 years ago

April 19, 1934

Porter pool bounds back into undisputed leadership in Michigan with the completion last week of seven new Dundee oil wells with initial productions aggregating more than 7,000 bbl. per day. Seventy rigs now are drilling in the general Porter area despite the spring breakup.

Joseph E. Morero, district geologist at Houston for Skelly Oil Co., has been made chief geologist with headquarters at Tulsa, filling a position vacant since 1930.

Steps are being taken for the organization of an operating agency through which California producers will be assured an outlet for all crude oil produced under curtailment and which will absorb surplus gasoline from time to time.

The Cayuga area, in northwestern Anderson County, is taking its place with other Woodbine sand fields in the East Texas district as a runner up for the No. 2 spot in importance. Van field, in Smith County still may retain its second place rating.

10 years ago

April 21, 1949

Sinclair Oil & Gas Co. completes its Lipps Ranch oil-discovery well in Roberts County as the first pre-Permian production in the Texas Panhandle portion of the Anadarko basin. It presages a new and possibly wide-scale play in wildcatting to the deep Pennsylvanian and Mississippian horizons.

Motorized petroleum equipment valued at more than $10,000,000 and representing every phase of oil activity passes in review in a 3-hour parade through Tulsa's business section. The International Petroleum Exposition and Petroleum Motor Transport Association sponsored the parade to celebrate the premier showing of the motion picture, "Tulsa."

Imperial Oil, Ltd., cuts the per-well take in the large Redwater field to 300 bbl. per day. It is a further proration move to ward off closing in some production in Alberta's rapidly expanding oil fields until facilities are available to move crude outside the prairie provinces.

At our Bethlehem stores, nothing is quite so important as pleasing the customer. We try to anticipate his preferences, his choice of brands, his buying habits. We strive to be ready when he's under pressure and requires extra service.

Often he hurries into the store and wants his order put together in nothing flat. We can usually accommodate him. Bethlehem stores are geared for emergency demands. But when he can take his time, and decides he needs a breather, we do our best to make him feel at home.

Bethlehem now has 55 stores in 13 states and Canada. All stock brands of merchandise you've known for years. But the stores have something else in common—friendly, personal service, no matter how small the customer's needs. Sound like something you've been looking for?

BETHLEHEM STEEL COMPANY
Supply Division
General Offices: 21 E. Second St., Tulsa, Okla.

West Coast: BETHLEHEM PACIFIC COAST STEEL CORPORATION
Supply Division
Los Angeles, Calif.

Canadian Distributor:
Bethlehem Supply Company of Canada, Ltd.
Calgary, Alberta, Canada

Export Distributor:
Bethlehem Steel Export Corporation
25 Broadway, New York, N. Y.

BETHLEHEM STEEL
SUPPLY DIVISION

Ringwood Gas Rises 3½ Cents

. . . to 6 cents per M.c.f. as 7-year-old suit is settled out of court. Higher prices could stimulate drilling.

AN OUT-OF-COURT settlement raising the price of gas in Oklahoma's Ringwood field has ended a case which would have tested the state's authority to order higher gas prices as a means of achieving conservation (OGJ, Jan. 26, p. 99).

The unusually low prices in the Ringwood casinghead-gas contracts have been in litigation some 7 years. They were agreed to originally because the field was threatened with being shut in due to flaring and high gas-oil ratios.

Several operators had declined to install gathering and processing facilities because the Ringwood gas was lean, low pressure, and widely scattered, and because the total reserve was not considered large.

In 1952 Warren Petroleum Corp. built a natural-gasoline plant and agreed to pay producers one-third of the liquids until payout of its investment, estimated to be 1960.

This netted producers about 2½ cents per M.c.f. Oklahoma Natural Gas Co. built the gathering system and is taking the residue gas at no payment until its investment is paid out, estimated to be in 1963.

Waste charged . . . In a case brought by the conservation staff of the Oklahoma Corporation Commission and joined by Ringwood producers, the commission was asked to have the field reclassified as a gas field and then to require a minimum price of 11 cents per M.c.f., which is what ONG is currently paying for residue gas in the area.

It was contended that the low price caused economic waste, discouraged further development drilling, impaired correlative rights, and invited premature abandonment.

Whether or not the state has such authority has never been fully tested in a situation such as this.

There was speculation that conservation orders might be issued revising gas-processing contracts in other oil fields.

The renegotiated contracts call for ONG to pay 6 cents per M.c.f., effective immediately. Shrinkage of 18.5% will mean a net to producers of 4.9 cents for raw gas at wellhead.

This will escalate by 1.1 cents in July 1963, which, after shrinkage, will net producers another 0.85 cent. Warren will begin paying 40% of liquid products in March 1960, estimated to net producers another ½ cent per M.c.f.

Producers say the new price will bring about some additional drilling in the field which should increase its known reserves. It is understood that the purchasers offered the higher prices rather than contest the power of the Corporation Commission to order an increase.

Spacing Bill Backed

. . . by Oklahomans in new move for wider pattern.

HEARINGS started last week on a state bill which would open the door to wider oil-well spacing in Oklahoma.

The proposed amendment to the present law would do away with the 40-acre maximum spacing for oil wells less than 9,900 ft. deep. It would give the Corporation Commission authority to order wider spacing if desirable.

The bill, which is being heard by the house oil and gas committee, has wide backing, including conservation officials, major companies, and independents. Some royalty owners and small independents have indicated opposition.

The commission already has authority to set wider spacing for oil wells producing from formations below 9,900 ft., and for all gas wells.

The bill was prepared by the conservation department itself and is backed by the Oil Industry Conservation Forum. The proposal is seen as an aid to conservation since it would encourage exploration and development in areas where a 40-acre pattern might be too costly.

Another bill with much industry support has been introduced. It would increase state production tax from one-eighth to about one-fourth of a cent per barrel to provide more funds for the conservation department. The department is considered one of the smallest among the major producing states.

PROCESSING BRIEFS . . .

Plans to make high-energy chemicals for missile-propulsion systems have been formulated by the chemical division of Celanese Corp. of America. Julius P. Zeigler, formerly chief of chemicals, propellants, and explosives development for the Department of Army Ammunition Command, has been named manager of high-energy materials operations.

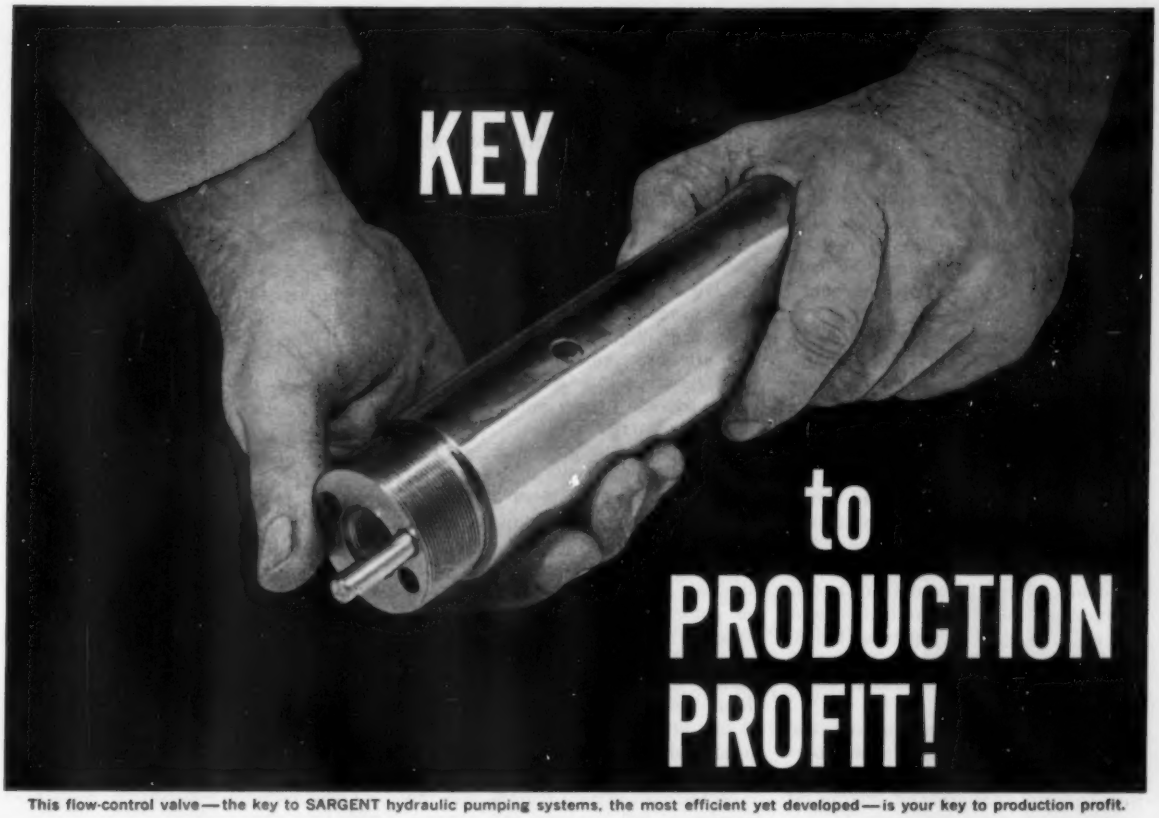
M. W. Kellogg Co. has won a round in its legal bout with Monsanto Chemical and Heyden-Newport Chemical. The New York Supreme Court has granted Kellogg's motion for arbitration of multimillion-dollar claims arising from construction of a methanol plant in Texas City. Kellogg had contract for design and construction of the plant for the two chemical companies.

LPG facilities are being built at Carter Oil's 34,000-bbl. refinery at Billings, Mont. A 560-bbl. deethanizer tower will be added to an HF alkylation unit now nearing completion. Refinery Engineering Co. expects to complete the tower in July. Other new facilities will include propane tank storage and loading rack.

Humble Oil & Refining Co. soon will place on stream the fourth unit of its "mothballed" butadiene plant at Baytown, Tex. The company put back in operation three of the four units last fall when the butadiene market improved. The plant, closed last spring, should be in full operation by early May.

New units will be added to the Spencer Chemical Co.'s Orange, Tex., plant to increase polyethylene output. Completion is scheduled in the summer of 1960. Plant personnel will be increased from 275 to about 360. The Orange plant makes polyethylene used in manufacture of packaging plastics.

Construction is under way at Sohio Chemical's new petrochemical plant in Lima, Ohio. The plant will manufacture acrylonitrile, using a new process developed by Sohio Research Center in Cleveland. Badger Manufacing, contractor, expects to complete the project early in 1960.



This flow-control valve—the key to SARGENT hydraulic pumping systems, the most efficient yet developed—is your key to production profit.

PROFIT = PRODUCTION – (Installation & Maintenance)

When SARGENT took the long stroke unit from the TOP of the hole and placed it at the BOTTOM to operate the time-proved standard bottom-hole pump, things happened!

WITH THE SARGENT FREE TYPE PUMP:

1. Sucker rods are eliminated, along with the cost of rod replacement and tubing wear.
2. Maintenance costs drop. No longer a need for costly crew time or expensive pulling equipment.
3. Maximum effective long, bottom-hole stroke is made possible by the exclusive SARGENT design which provides positive plunger travel with pre-set valve spacing.
4. Unrestricted application because the pump can be used on any well or on more than one well in group operations.
5. This pump has been operated on oil, salt water or fresh water as power fluid.

UNDER THE TOUGHEST FIELD CONDITIONS

"MISSILE QUALITY" PUMPS

"Missile Quality" represents the uncompromising excellence of product engineering and manufacture where "almost perfect" is not good enough. Years of experience in the design and production of missile, aircraft and marine components enables SARGENT to produce "missile quality" A.P.I. classified pumps in advanced metals and designs to meet any well condition – your assurance of better pump performance.

If you are interested in "production for profit" use SARGENT.
Talk to your SARGENT Representative and learn how profits can be boosted by lowered "Installation-Maintenance" costs.

SALES AND SERVICE

CALIFORNIA
Long Beach
Bakersfield
Ventura
Taft
Huntington Park
Santa Fe Springs

OKLAHOMA
Oklahoma City*
Ratliff City
Pawhuska
Seminole

NEW MEXICO
Farmington
Hobbs

COLORADO
Rangely

TEXAS
Odessa
Snyder
Andrews
Midland*
Sundown
Wichita Falls

ILLINOIS
Grayville

ARKANSAS
Magnolia

KANSAS
Chase
Russell
Great Bend*

*Sales Representation

"GOOD WILL" is the disposition of the pleased customer to return to the place where he has been well treated.– U. S. Supreme Court

Sargent INTEGRITY BUILDS GOOD WILL

Standard of Excellence Since 1920

ENGINEERING CORPORATION

MAIN OFFICE & PLANT • 2533 E. FIFTY-SIXTH ST.
HUNTINGTON PARK, CALIF.

Texas Pipeline Bill Endorsed

. . . by Senate group. Proposal to tighten oil-buying law supported by independents, hit by Thompson, majors.

THE oil and gas committee of the Texas Senate has finally approved and sent to the Senate a heavily rewritten bill aimed at tightening the law governing oil buying by common purchasers.

The bill, Sen. Grady Hazelwood's SB 216, as approved by the committee would require a common purchaser affiliated with a common-carrier pipeline system to purchase crude oil ratably in "the general area" of that system without discrimination.

It charges the Texas Railroad Commission with responsibility for determining "the general area" and for otherwise administering the law. In so doing, the bill would have the commission consider "production and age of wells in the respective fields, the purchasing history and ability of such common purchaser and all other proper factors."

It also gives the commission the authority to relieve any such common purchaser after notice and hearing from the obligation of buying oil of "inferior quality or grade."

Viewpoints clash . . . The bill, prior to committee approval, was strongly supported by independent spokesmen, roundly criticized by Sinclair Oil & Gas Co. and other major oil companies, and labeled as unnecessary by E. O. Thompson, chairman of the Texas Railroad Commission.

Thompson, asked by the committee to appear to answer questions, said the June 4, 1958, order of the commission seemed to have already "covered the waterfront." This order set up ground rules and procedures governing connections of wells to common carrier pipelines (OGJ, June 16, 1958, p. 59).

Thompson said he felt the law, along with not being needed, would invite litigation whereas "the commission's methods are court-tested." The June 4 order, he said, has not been used since it was issued (due to lack of complaints).

John Davenport, of the Texas Independent Producers and Royalty Owners Association, disagreed with Thompson over the need for the bill. The commission's June 4 order, he said, was a "tremendous advance" but dealt with pipeline connections whereas the Hazelwood bill "deals with purchasing of oil." TIPRO was joined in its support of the bill by the West Central Texas Oil and Gas Association and individual independents.

Paul McDermott, attorney for Sinclair, led the opposition with an exhaustive legal brief. He said the bill would have a demoralizing effect in that, since all major pipelines in the state are interconnected, a producer could tender oil to the nearest line for the account of any purchaser with a common-carrier affiliate.

Thus, he said, a purchaser in Corpus Christi might have to buy oil in West Texas. The purchaser "wouldn't know each morning how much oil he was going to have to buy."

McDermott argued that the commission's June 4 order goes as far as the commission or the law can go without running into constitutional barriers. Further, he said, no discrimination is taking place in oil purchasing or connecting of wells. Proof of this lies in the "failure of anyone to take advantage of the commission's June 4 order by seeking a hearing."

McDermott argued further that the Hazelwood bill is vague and general. "General area," he said, is a phrase which cannot be determined clearly.

Brine Flow Cut

. . . as Arkansas producers move to reduce pollution.

THE AMOUNT of salt water now being dumped by Arkansas oil operators, which results in stream pollution, will be reduced by 162,767 bbl. daily by March 1960.

Reports filed by 195 companies and operating units with the Arkansas Water Pollution Control Commission promise reductions of:

. . . 118,000 bbl. daily by reworks, plug backs, or injection.

. . . 33,000 bbl. daily by plugging and abandoning.

. . . 11,387 bbl. daily by pits.

In all, 70 Arkansas wells will be abandoned the next 12 months, companies reported. Some will be converted to disposal wells.

M. L. Wood, Little Rock, commission director, said the figures are the first resulting from a new Arkansas law which provides severance-tax relief to oil operators providing underground salt-water disposal systems.

Five-year program . . . The Arkansas tax is 4%, or 12 cents a barrel, on wells producing 10 bbl. daily or less and 5% or 15 cents on wells producing more than 10 bbl. daily.

Operators will receive credit against their severance tax bill for entire cost of installing underground systems.

The law requires operators to cut the volume of salt water discharged into streams by at least 20% each year. This allows 5 years to complete the anti-pollution measures.

Operators filing initial reports listed 3,611 wells making 546,785 bbl. daily of salt water in their oil-production operations. The 162,767-bbl. reduction proposed the first year represents more than one-fourth the total brine production reported.

Oil Taxes Urged

. . . by California governor in new attack on industry.

ALREADY threatened with a 2% severance tax now being studied by the state legislature, California oil companies last week learned that an amendment calling for a 2% levy on oil imports will be tacked on the bill.

Gov. Edmund Brown, in a statewide tour plumping for a $256-million tax boost, told a Santa Barbara audience he didn't feel the oil industry was paying its way in the state.

He said he recommended the levy on imports after domestic producers complained the severance tax would put them at a competitive disadvantage to imports.

Oil hits back . . . Brown's assertions that the oil industry wasn't paying its fair share of government costs in California brought an immediate and hot blast from oil spokesmen.

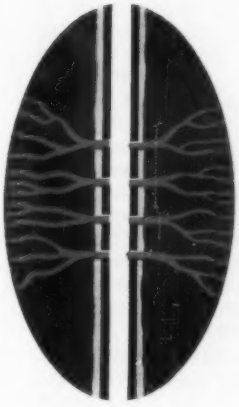
In a stinging letter to the governor, Stark Fox, executive vice president of the Oil Producers Agency of California, in effect challenged Brown to put up or shut up in his charges against the industry. Fox told the governor that as far as his association was concerned, every evidence pointed to the oil industry as more than paying its way.

Felix Chappellet, vice president and general manager of the Western Oil and Gas Association, said the industry already pays more than 8% of the cost of running state and local governments in California.

The 2% severance tax measure now in the legislative hopper is expected to add between $19 million and $22 million to the oil industry's state tax bill. What the 2% levy on imports would amount to wasn't indicated.

MECHANO-CHEMICAL ACTION...
For Greater Effectiveness

HALLIBURTON
Acidfrac

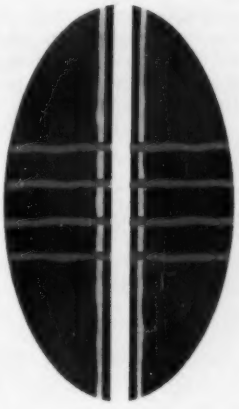


A combination stimulation treatment incorporating both acidizing and fracturing, gives your well the production improvement benefits of each. ACIDFRAC often stimulates production more than conventional fracturing or acidizing treatments, especially in limestone and dolomite formations.

An efficient sand carrier, ACIDFRAC is an acid-in-oil emulsion, with a slower reaction rate which makes it particularly effective in increasing and enlarging the permeability of the fracture tributaries.

ACIDFRAC is adaptable to the needs of today, with temperature stability for deeper wells. Friction loss may be modified for specific well conditions. Its relatively low fluid loss characteristics may be further reduced if required.

Check the "Mechano-Chemical action" advantages of ACIDFRAC with your local Halliburton Fracturing Specialist. Call your nearby Halliburton office for more information.



HALLIBURTON

FRACTURING SERVICES

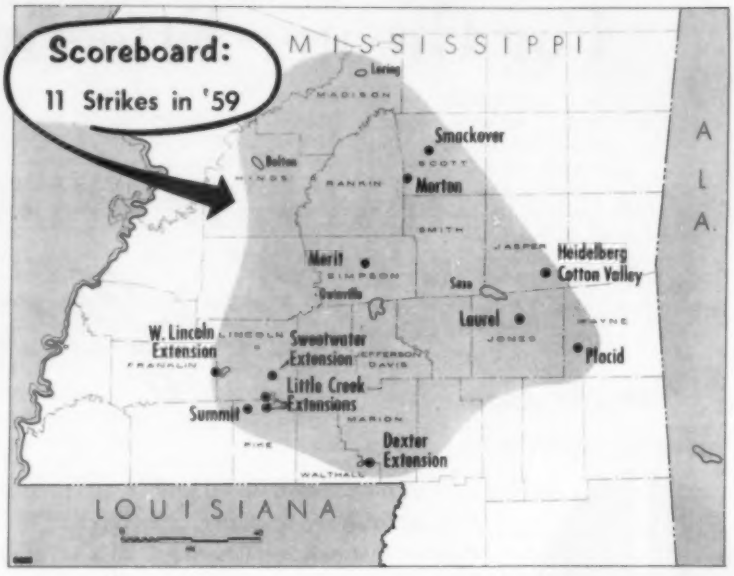
HALLIBURTON OIL WELL CEMENTING COMPANY • DUNCAN, OKLAHOMA

"CONTINUE TO LOOK TO HALLIBURTON — FOR LEADERSHIP"

Mississippi Top Deep-Drilling Area

- **Wildcat activity hits highest peak of the last several years.**

Neil Williams
Associate Editor



SOUTH Mississippi's deep drilling play is reaching wider and lower in a buildup of exploration that has made it the country's most active oil area.

Mainly directed at Lower Cretaceous and older horizons, the play is being enlivened by a revival of exploration of the shallower and more widely exploited Tuscaloosa sands of Upper Cretaceous age.

Exclusive of wells within known productive areas, more than 30 rigs are now engaged in wildcat drilling to Cretaceous and lower (Jurassic) horizons, most of them projected from 10,000 to below 15,000 ft.

Drilling activity has climbed to the highest level of the last several years. A year ago at this time there were fewer than 20 rigs on wildcat tests to these horizons.

Altogether, more than 75 wildcats have been drilled or started to these deeper formations this year. Of these, at least 11 have been completed as discoveries. Thirty-four have been abandoned, although several of these have given indications of possible new production.

Drilling to deep production horizons within known fields boosted the total number of wells completed during the first 3 months of this year to more than 165, more than 60 above the number drilled the same period last year.

High score . . . Already this year, South Mississippi's deep drilling play has accounted for the discovery, or virtually assured discovery, of at least seven new fields and opening of additional productive zones and major extensions in and around many others.

Among these is a prospective new oil discovery from the Jurassic-Smackover formation, geologically the deepest horizon in the South Mississippi salt basin to be produced, or even reached by the drill.

If completed successfully, this discovery, by The California Co. on its Forkville Unit, in Scott County, will be the first oil production from this deep horizon.

Relatively few wells in Mississippi have been carried this deep, and so far the only commercial Smackover production in the state is in Loring field, in Madison County.

Carter Oil Co. has two hydrogen sulfide and carbon dioxide gas wells there. Back in 1951, Union Producing Co. completed a sour-gas well from the Smackover in the old Tinsley field, but this was shut in and since has been abandoned.

New impetus is being given to drilling below the Lower Cretaceous to Jurassic horizons by the completion last week by Gulf Oil Corp. of a Cotton Valley (Jurassic) oil discovery in the old Heidelberg field, in Jasper County.

This opens the state's second Cotton Valley field, following Gulf's discovery of Cotton Valley production last year at Soso, also in Jasper County.

The Heidelberg Cotton Valley well also has been completed as a good oil producer in Rodessa sand, adding that field to the growing list of Mississippi fields with Lower Cretaceous production.

Until now, Heidelberg, one of the state's older fields, has produced exclusively from Eutaw and Tuscaloosa sands of Upper Cretaceous age.

Other fields . . . Additional Lower Cretaceous fields found in deep drilling this year are at Laurel, in Jones County, and Merit, in Simpson County.

Discovery wells in these new fields are oil productive from the Paluxy zone, adding prestige to this previously somewhat questionable horizon. The Merit discovery also showed for a good producer in the slightly deeper Mooringsport zone, and it may be dually completed later.

Paluxy sand also has proved productive in a new Lower Cretaceous discovery at Sandy Hook, in Marion County, where previous wells have been drilled only to the Upper Cretaceous-Tuscaloosa sands.

Here the Paluxy is a gas-condensate reservoir. The discovery well also was completed in the field's Tuscaloosa sand, giving the field a sizable extension in that pay.

Another Lower Cretaceous discov-

INDUSTRY

Stuck pipe has delayed operations at Halbouty Alaska Oil Co.'s important wildcat on Kenai Peninsula. The trouble occurred when operators were coring at 11,017 ft. Projected depth is 12,000 ft. The test, a joint venture by Halbouty and King Oil Co., is 3½ miles southwest of Kenai's second producer, the 2 Swanson River Unit. Coastal Drilling Co. is contractor.

Three representatives of Teikoku (Imperial) Oil Co. of Japan were to arrive in Anchorage, Alaska, April 18 to arrange a joint agreement with Polaris Exploraton Co., Inc., for exploration work in Alaska. George S. Grimes, Polaris president, says the Japanese group hopes that Alaska

ery is indicated in an ultra deep wildcat drilled by Pan American Petroleum Corp. about 6 miles southwest of the large Gwinville Upper Cretaceous field in Jefferson Davis County.

Passing up promising showing, Pan American has deepened the hole to 15,274 ft., where it unexpectedly drilled into salt, proving another deeply seated salt dome for the basin.

Search spurred . . . Revival of active exploration of the previously much-explored Upper Cretaceous formation is being inspired by the large-scale prolific production found in Tuscaloosa sand at Little Creek, on the Lincoln-Pike county line.

The field, opened early in 1958, was the first important Upper Cretaceous discovery in several years. Its discovery initiated a sizable development program in which more than 65 wells already have been drilled extending production in the 10,700-ft. horizon over an area almost 5 miles long and more than 3 miles wide.

More than a dozen rigs still are running in the immediate area.

Upper Cretaceous sands, chiefly Eutaw and Tuscaloosa, were primary objectives in earlier Mississippi exploration and have accounted for production in more than 50 fields.

For many years, few wells were drilled below the Tuscaloosa, lowermost Upper Cretaceous member. But with the prospective drilling areas for those pays supposedly playing out, interest in these pays lagged in favor of the more virgin potentialities of deeper exploration to Lower Cretaceous sands.

In spreading Tuscaloosa exploration this year, new fields already have been opened at Summit, 6 miles west of Little Creek, in northwestern Pike County, and near Pickwick, in southwestern Marion County. The latter discovery is 2 miles east of Tuscaloosa and Paluxy production at Dexter and might prove an extension of that field.

Added to these is Reedy Creek field in Jones County, where the second well, drilled to confirm a Lower Cretaceous discovery of last year, has been completed in the shallower Tuscaloosa sand as a new pay strike.

Extensions made . . . Major extensions of Tuscaloosa production have been made at Sweetwater and West Lincoln fields, in Lincoln County. Extension of the latter is 2 miles west into Franklin County.

New Tuscaloosa play, until now largely concentrated in Lincoln, Pike, and adjacent counties on the south side of the basin in southwestern Mississippi, is stretching to the far eastern side of the state with an indicated discovery by Placid Oil Co. in Wayne County.

Among Upper Cretaceous fields opened this year is a discovery in southwestern Scott County incident to the deeper Lower Cretaceous and Jurassic drilling.

There, a wildcat drilled by Shell Oil Co. to the Cotton Valley below 11,000 ft., failed to find production in the lower horizon but made a good oil well in a 6,400-ft. Eutaw sand. This discovery, 1 Morton field, which gave Scott County its first production, is more than 45 miles along the trend from the nearest other Eutaw field.

Octanes to Rise

. . . in Great Lakes pipeline if owners approve plan for jumping regular to 91.

A PROPOSAL to boost octane numbers of regular gasolines from 89 to 91 is being made by Great Lakes Pipe Line Co. in a poll of owners.

Regular gasoline has been at 89 since late May 1957. It was raised from 86 to 88 in early May 1956. Those polled include Continental, Sunray Mid-Continent, Skelly, Texas, Pure, Sinclair, Phillips, and Cities Service.

Most Gulf Coast regular gasoline now is 90 to 92 octane, styled for lower altitude consumption. Mid-Continent marketers served by Great Lakes say regular gasoline sales have not been affected by higher Gulf Coast ratings.

They discounted reports that movement of the higher octane regular up the Mississippi River and into the Midwest was behind proposed improving of regular grades.

Some pressure on refiners is being felt as a result of new-car advertising. Many of the new models are being advertised as designed for top performance on regular gasoline.

"We're studying the proposal," said one marketer. "We must be competitive in quality. However, we can see no need for raising octane points of regular. We think 89 is high enough and there has been no loss of business caused by this rating."

BRIEFS . . .

eventually may furnish some of Japan's petroleum requirements.

The stock holdings of Clint W. Murchison, Dallas independent, in Murmanill Corp., Dallas, have been sold to Gerald C. Mann, president of Murmanill and of Bankers Life & Casualty Co., Chicago. Murchison owned about one-half the Murmanill shares. Murmanill is principal owner of C. G. Glasscock-Tidelands Oil Co., Inc., Corpus Christi, a pioneer offshore drilling firm.

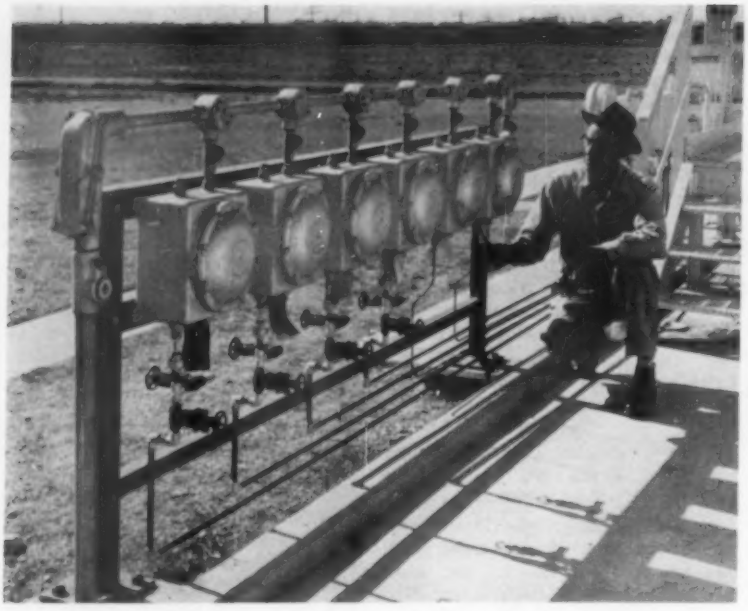
Sunset International Petroleum has acquired Shell Oil's interests in Santa Ana and Fresno Land Co., and Properties, Inc., leases in the Raisin City, Calif., field. They include 110 acres and 16 oil wells, producing 90 bbl. daily. Eleven wells, now idle, will be reworked.

Stockholders of International Refineries and Western Oil & Fuel have voted to sell assets of the companies to Continental Oil. The companies market gasolines in Illinois, Iowa, Minnesota, Montana, North Dakota, South Dakota, and Wisconsin. Stockholders will receive shares of Continental common stock for their holdings.

A study detailing geological features of the Pinto Canyon area of the Marfa basin in Presidio County, Texas, has been published by the Bureau of Economic Geology, University of Texas. Economic prospects, geological history, and structures are cited. The research was done by David L. Amsbury, under direction of Prof. Ronald DeFord, University geologist.

Its bid of $4,021,465 for mineral rights on 2,887,607 acres in the Yukon and Northwest territories makes Pan American Petroleum Corp. the largest landholder in the area. Shell Oil Co. paid $1,440,226 for nine leases. The sale boosted the number of acres under lease there to 79,000,000.

A total of 16,900,000 bbl. of crude was produced in Kansas secondary-recovery operations in 1957. Greenwood county with 5,870,000 bbl. and Butler county with more than 4,000,000 bbl. marked up more than one-half the state's waterflood production. The Kansas Secondary Recovery Committee of the IOCC prepared the summary.



Big Rancho Crude Line Goes Automatic

SHELL Pipe Line Corp., which operates the Rancho Pipe Line between West Texas and the Gulf Coast, has modified three of Rancho's four pump stations to make them completely automatic. The fourth will be converted later.

Telemetering equipment automatically transmits operating data to the Pasadena, Tex., terminal near Houston. The photo above shows such equipment at Mesa station, near McCamey, Tex.

Shell operates the 24-in. crude line for seven pipeline companies—Ashland, Crown-Ranch, Nantucket, Service, Phillips, Shell, and Sinclair. Capacity is 250,000 bbl. per day.

Dollarhide Project Approved

. . . by Texas commission after Pure submits revised plan for unitization, secondary recovery in multipay field.

PLANS for unitization and secondary recovery for most of big Dollarhide multipay field in West Texas were belatedly approved last week by the Texas Railroad Commission.

The Dollarhide program was laid before the commission by Pure Oil Co., as projected unit operator, at a hearing in February. It called for a unit, water flooding of the Clearfork "AB" and "C" zones and the Devonian, and pressure maintenance in Silurian and Ellenburger pools.

The commission, after some weeks of study, declined to rule on the application on grounds that it did not have legal authority to approve unitization unless some type of secondary recovery operations were started in the reservoirs unitized.

The objection was aimed at the plans for the field's Silurian and Ellenburger pays. Dollarhide operators proposed to maintain pressures in these zones by transferring allowables to control water production—indicating that water injection might be employed later if needed.

The hearing reconvened April 10 at Pure's request. Pure submitted a revised program calling for water injection through one dually completed input well into both the Silurian and Ellenburger.

The commission quickly followed through with a permit.

Expected recovery . . . At the first hearing, Pure estimated that the Devonian and Clearfork water floods would cost between $1,900,000 and $2,250,000 and recover between 12,500,000 and 23,000,000 bbl. above primary take (OGJ, Mar. 2, p. 78). It made no estimates as to recovery added by pressure maintenance in the other pays.

The company gave no testimony at the reopened hearing as to increased cost or recovery resulting from the change in plans to include water injection into the Silurian and Ellenburger.

During the hubbub, the commission quietly approved a gas and water injection project proposed earlier in the year by Cities Service Oil Co. for its acreage in the field adjoining the Pure unit.

New Plan Proposed

. . . by Midwestern to bring Canadian gas to Midwest.

MIDWESTERN Gas Transmission Co. laid before the Federal Power Commission last week the second of two proposals to furnish natural gas to the Middle West.

The new application follows an earlier-announced plan to take 200 million cubic feet of Canadian gas daily from Trans-Canada Pipeline at the U. S.-Canadian border south of Winnepeg and deliver it to upper Middle West markets.

Midwestern, a subsidiary of Tennessee Gas Transmission Co., told the FPC it would build a pipeline from the border to a point near Marshfield in Central Wisconsin to tie in with a line to be built from there to Green Bay, Wis., by Michigan Wisconsin Pipeline Co.

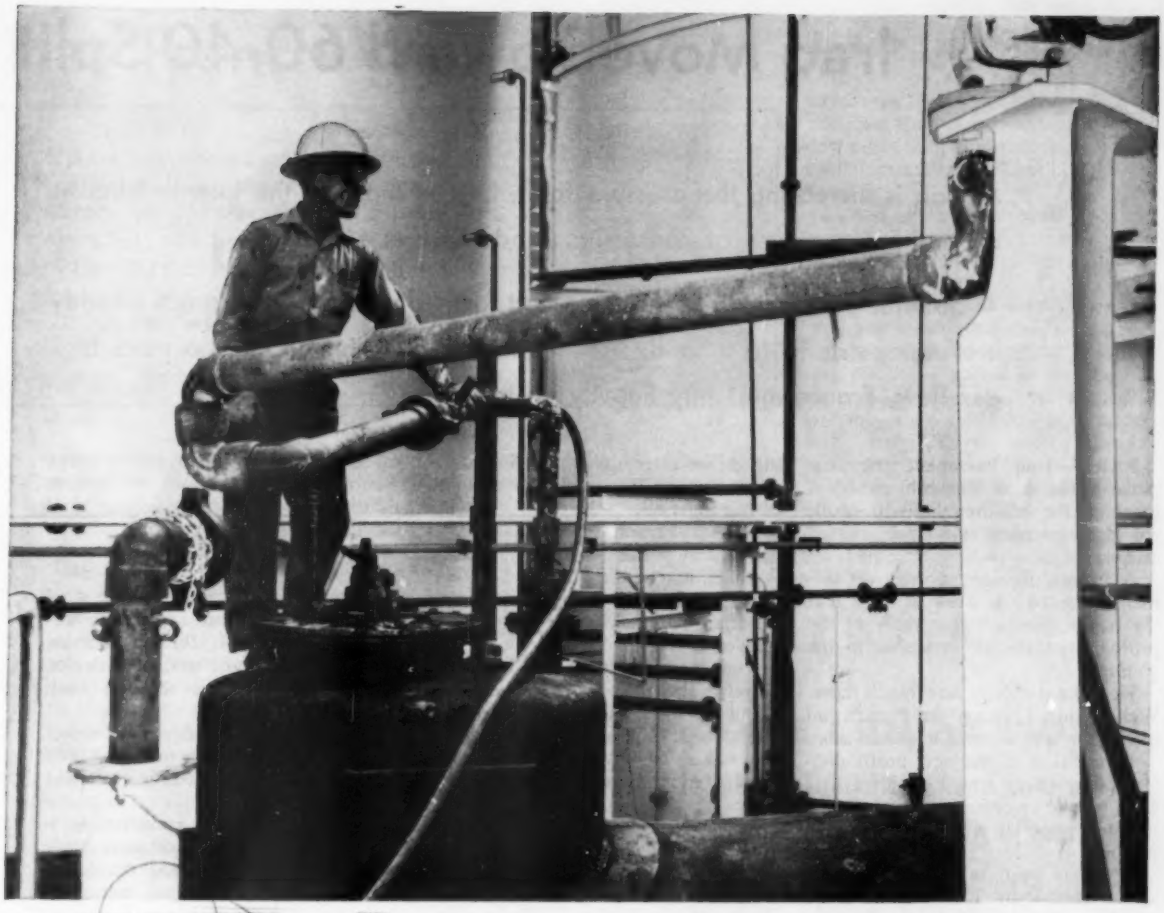
Michigan Wisconsin filed its application to build the line at the time of Midwestern's filing.

Midwestern currently is awaiting an FPC decision on an earlier application to move gas from a proposed pipeline from Portland, Tenn., to Joliet, Ill., to serve the Chicago-Gary area (OGJ, March 30, p. 97).

The two applications follow a decision of the FPC last October rejecting a Midwestern plan that would have tied the two projects together.

The Canadian - Marshfield project would consist of 504 miles of 24-in. line costing $52,270,000. Michigan Wisconsin would take 158 million of the proposed 200 million cubic feet of gas daily, and Northern States Power Co., Minneapolis, would take another 30 million. Other companies would get the remaining 12 million.

The project must be approved both by the Canadian Government and the FPC. Midwestern hopes to build the pipeline in 1960. It asked the FPC for approval by November 1 this year.

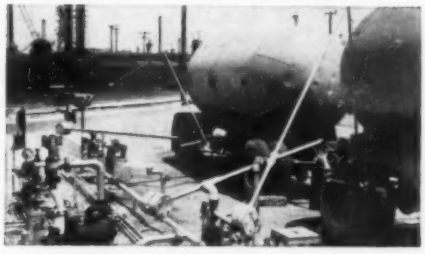


IN FLUID HANDLING— **CHIKSAN**

LOADING ARMS

give hard-to-handle liquids a
SAFE SEND-OFF . . .

Chiksan Loading Arms, with their versatile ball-bearing swivel joints, combine unlimited flexibility with the safety and longevity of metal. With Chiksan there's never a problem of hazardous, often costly, line rupture loss. In fact, whatever fluid you are handling, you get longer life, spend less on maintenance, with Chiksan Loading Arms. Write for descriptive literature today.



Chiksan Loading Arms deal with hard-to-handle corrosive chemicals, hydrocarbons, and other fluids and gases, speedily and safely, in all kinds of weather.

A SUBSIDIARY OF FOOD MACHINERY AND CHEMICAL CORPORATION

fmc

CHIKSAN

CHIKSAN COMPANY—BREA, CALIFORNIA • CHICAGO 5, ILLINOIS • NEWARK 2, NEW JERSEY

Well Equipment Mfg. Corp. (Division), Houston 1, Texas • Subsidiaries: Chiksan Export Company • Chiksan of Canada, Ltd

A Journal
SPECIAL REPORT
No. 2

Iraq Move Toward 60-40 Split

- Iraq is increasing the pressure for a bigger share of the income from its oil and for a return of concession lands not yet explored.
- Journal editor finds Paris concerned for two reasons: The French already are unpopular in Iraq, and, until Sahara production becomes a much bigger flow, France must rely heavily on Iraq oil.

PARIS—Iraq has made the first move in the Arab oil world aimed at breaking the traditional 50-50 profit sharing agreement that has existed since 1951.

A French foreign ministry spokesman conceded last week in Paris that the Iraqis want a bigger share of the profits from the oil produced in the country.

He did not specify how much more. Well-founded reports in French oil circles say Iraq wants a 60-40 division.

In addition to the new profit division, Iraq wants Iraq Petroleum Co., Ltd., to give up concession areas in the country where it is not now producing oil.

IPC has been talking periodically about this with Iraqi officials for months without reaching any decision on what areas will be given up or the extent of the acreage to be surrendered.

The official French comment that Iraq wants a bigger cut came in an effort to dispel almost hysterical rumors and printed reports in France that the Iraqis planned to nationalize the French share of IPC. Cie. Francaise des Petroles owns 23.75% of IPC and France gets a large share of her 420,000 bbl. daily crude supply from Iraq.

Equal shares in IPC are owned by British Petroleum Co., the Royal Dutch-Shell Group, and Jersey Standard-Socony Mobil. The remaining 5% is held by the Gulbenkian foundation, a part of the estate of the late legendary "five-percenter."

Why France worries . . . In marked contrast to the French opinion that the leftist regime of Maj. Gen. Abdel Karim Kassem intends to seize the French share of the oil operation, the British owners have treated the whole question of nationalization with a great deal of caution.

The French are particularly susceptible to fear in Iraq for two reasons:

. . . Until Sahara fields are producing oil in large quantities, France is dependent on Iraq for a major share of her franc oil.

. . . Anti-French feeling in Iraq is an official position. Iraq is the only Arab nation in the Middle East that includes financial assistance to the Algerian nationalists officially in its budget.

The average Frenchman last week merely shrugged when questioned about the mechanics of partial nationalization. He pessimistically assumed that seizure of only the French interest would be no hurdle at all for Iraqi logic.

It was largely because of this attitude among the French that the foreign ministry in Paris issued a statement in the face of cautious British, American, and Dutch silence. The spokesman pointed out that all stockholders are solidly opposed to nationalization of any part of IPC. He added that such a move would be "legally impossible."

This statement only partially allayed fears of Gallic skeptics who reason that nationalism in the Arab world would be largely extra-legal anyway.

The official French statement said that Iraq wants to "obtain higher royalties" and is not questioning the basic concession agreement which allows IPC to operate in the country.

Iraq wants "some clauses revised," the French official said, but added that any such revision would be made with the agreement of all parties concerned. Just how far IPC would go in opposing a bigger slice of oil profits to Iraq in the face of a political trend that has alarmed the whole western world, is not yet clear.

Under the terms of the 1951 agreement, Iraq may demand higher royalties if and when any other oil-producing country in the Middle East is granted a more favorable profit split.

Theoretically, the new, so-called 75-25 agreements made by American and Italian companies in Iran and the 56-44 and 57-43 agreements made by the Japanese for offshore Neutral Zone concessions would have no effect on the Iraq movement until the countries involved actually began to collect. This is still years away.

Iraq statement . . . At almost the same time the French announcement was made in Paris, Dr. Ibrahim Kubba, Iraqi economic minister, also denied that nationalization is on the Iraqi mind.

Beirut radio broadcast a report from Baghdad quoting the Iraqi minister as saying nationalization has never been discussed.

He added that his government is sticking by the announcements made immediately after the Iraqi revolution last July. At that time the new revolutionary Kassem regime said publicly that the "agreements will not be amended without the acceptance of the companies."

"Negotiations are still going on between the two sides regarding many points, the most important of which is the relinquishing by the companies of their rights in all the Iraqi lands in which prospecting has not yet taken place," Dr. Kubba said.

He added that the "talks are proceeding in a friendly atmosphere. We hope they will end successfully."

Speculation about the Iraqi aims began to build a week ago when R. G. Seawright, chief British representative of IPC in Baghdad was summoned for a 2-hour session with Premier Kassem and Dr. Kubba.

Just a day before, IPC announced in London that Lord Monckton, chairman of IPC, and Lady Monckton were leaving for a tour of the company facilities in Syria, Lebanon, and Iraq.

London said there was no connection between this visit and the negotiations, but Lord Monckton, who became IPC chairman less than a year ago, has the reputation of a skilled negotiator. He presumably will see both Premier Kassem and Dr. Kubba.

Has French Worried

THIS IS the second in a series of special reports from abroad written by the Journal's International Editor, Paul E. Swain. Swain is now on an 8-week tour of foreign oil operations which will take him through all of Europe, Northern Africa and the Middle East.

The first article, a report from London on Europe's views on the threat of Russian exports, appeared in the April 13 issue.

Iraqi politics . . . The minister of economics, Dr. Kubba, is regarded apprehensively by most western observers because of his Communist leanings.

He recently returned to Baghdad from Moscow after concluding trade agreements and assistance pacts with the Russians.

One significant agreement concluded on this trip was a pact with the Russians to help Iraq look for oil in those areas eventually surrendered by IPC.

The arrival of Soviet "technicians" in Iraq to undertake such a program is of great concern to western observers.

This would fit the classic Russian pattern of flooding a friendly, underdeveloped country with Communist agitators and agents, along with a technical assistance staff.

The obvious leaning of Premier Kassem's government toward Russia in his effort to counter the influence of Egypt's Premier Abdel Gamal Nasser has the West worried.

The influential "Economist," published in London, last week carried a short analytical article on Iraq which said there is no longer any question about whether or not Iraq will "go Communist."

"The country is controlled by Communists already," the Economist said.

Iraq oil development . . . Iraq has produced and moved to the western world more than 2 billion barrels of oil since the first commercial discovery at Baba Gurgur, Kirkuk, in October 1927.

Last year the three IPC companies: (IPC, Basrah Petroleum, and Mosul Petroleum), reached a near record production of 800,000 bbl. daily, making IPC the fourth largest producer in the Middle East.

A major expansion program was under way before the July revolution which overthrew the Hashemite regime in the country. The 30 and 32-in. main line from Kirkuk to Banias, Syria, is undergoing a 116-mile looping program to increase the daily throughput.

The biggest single portion of the expansion program is a major deepwater terminal at the head of the Persian Gulf (which the Iraqis insist should be called the Arabian Gulf). This will eliminate the bottleneck that has held down increased production from the southern fields of Rumaila and Zubair.

A bar in the Shatt-Al-Arab, which separates Iran and Iraq, allowed only small tankers to load the southern production.

A new two-rig development drilling program in the southern fields is going along with the terminal construction. Political unrest in the country and two revolutions—one successful and the other a failure—have apparently done little to impede the expansion.

So far, the new Iraqi regime has leaned over backward to avoid interfering with oil operations in the country. The $237 million paid to Iraq in royalties is too important to tamper with.

Big Strike Booms Libyan Hopes

. . . as Esso test 100 miles inland flows at a rate of 100 bbl. hourly from 180 ft. of pay. It's drilling ahead.

ANOTHER good discovery, the second in recent weeks, makes Libya look more and more like a coming oil country.

The new strike was made by the Libyan affiliate of Standard Oil Co. (N. J.) on concession Block 6 in Cyrenaica. It's about 100 miles from the Mediterranean Coast and 200 miles south of Bengazi.

Esso Libya's Zelten 1 flowed about 100 bbl. per hour from a 180-ft. pay section of Paleocene between 5,380 and 5,560 ft. The company ran six drill-stem tests, five of which were successful. The recovery was clean 37°-gravity oil.

The parent company said the well is being drilled to greater depth.

Other good finds . . . The discovery is the third in the coastal region to offer hope of commercial possibilities, and is the best looking well ever drilled in Libya. Block 6 covers nearly 10,000 sq. miles and extends all the way to the sea.

Zelten is about 500 miles east of Libya Shell's discovery near Bir Tlacsin on Block 70. Shell last month said this well may be good for 1,000 bbl. daily. A half-hour drill-stem test from 8,909 ft. yielded 30 bbl. of crude and 1½ bbl. of water.

The Esso strike also is about 150 miles east of the Oasis Oil Co. discovery Block 32. Oasis Oil, a subsidiary of Ohio Oil Co. and operator in Libya for the Conorada group, is drilling several wells to appraise commercial possibilities of two finds on the block.

Bahi 1 yielded 75 bbl. on a 2½-hour test, and Dahra B-1 yielded 38 bbl. on a 75-minute test (OGJ, Mar. 30, p. 109).

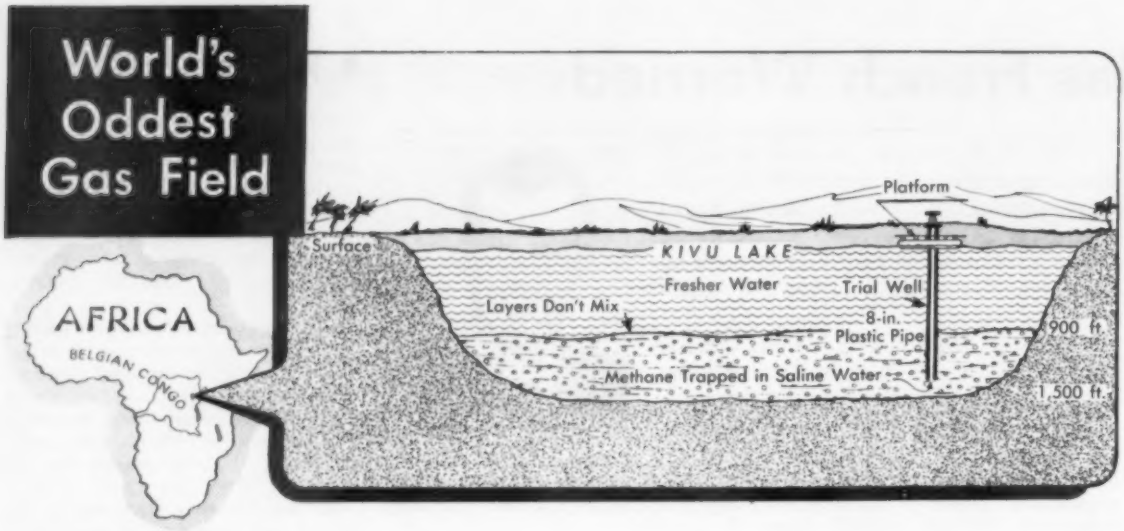
Texas Gulf moves in . . . A Texas Gulf Producing Co. subsidiary will start a wildcat next month on acreage bordering Block 32.

Libyan-American Oil Co. will drill the well on Block 17, a 1,725-sq.-mile concession immediately west of Oasis acreage.

Gordon W. Reed, chairman of Texas Gulf, said in Houston last week that there are three likely geological structures in the Libyan-American concession which is about 75 miles south of the Gulf of Sirte.

Reed said his company has an agreement with a major oil company which assures a market in Europe in case of commercial production.

Libyan - American was the first company to start drilling in the Libyan oil play 3 years ago.



Weird Belgian Congo Gas Field Is Tapped

• No drilling needed to sink well into watery methane "bubble." Plastic pipe is just lowered into pay zone.

A BELIEVE-it-or-not gas well has been flowing 100,000 cu. ft. daily from a well lowered into the pay zone without drilling.

What's more, the zone has 100% porosity, 100% water saturation, and is not covered by impermeable rock. The flow has continued undiminished for 10 months through a plastic pipe supported by a floating platform.

The science-fiction well is located 200 yards out from shore in Lake Kivu, a mountain lake in eastern Belgian Congo. It is producing from a zone of methane-saturated salt water. The layer is about 600 ft. thick and covers about 586 sq. miles.

The gas is not underneath the lake bed. It is in the lake water itself. Belgian engineers say more than 2 trillion cubic feet of methane is indicated, out of a total of 8 trillion cubic feet of gas.

The gas was first discoverd in 1937 during a hydro-biology survey sponsored by the Belgian Government. Some years later samples were taken from the depths and the gas analyzed.

Details of the watery gas "field" were brought from Central Africa by Thomas D. Cabot, president of Godfrey L. Cabot, Inc., which has interests in domestic natural-gas production, and carbon black.

Waters don't mix . . . On the basis of scientific theories, the lake is unique in that water doesn't circulate with normal convection currents.

Somewhat heavier saline water stays at the bottom. Fresher water floats on top. The lower stratum holds the gas, which is approximately three-fourths carbon dioxide and one-fourth methane. Methane is almost insoluble normally, but the lake is so deep that the gas became soluble under high pressures. The average depth is 1,500 ft.

There is almost no gas until the water depth reaches 900 ft. Below this level gas volume increases rapidly, with increasing quantities of carbon dioxide at greater depths. The methane content remains the same. Each cubic foot of water below 1,000 ft. holds 0.4 cu. ft. methane.

Hard to explain . . . The most plausible explanation of the origin of the methane is that it formed from decaying animal and vegetable matter falling into the depths from the surface.

The big puzzle, however, is what keeps the gas-bearing stratum permanently at the lake bottom. Other lakes circulate when water at the top is cooled by evaporation, and descends to replace warmer and lighter water below.

Tests on Lake Kivu show that surface water circulates to 900 ft. only. Mixing with the lower layer of heavier salty water is at a minimum. There is no evidence of gas on the surface of the lake except where the plastic pipe has pushed through the "skin of the bubble."

A key to the mystery may be in underwater saline springs, caused by new lava flows from which minerals have not yet been leached. The lower water has 0.35% minerals content, keeping it heavier than warmer surface water. Any gas forming in the depths has had a chance to accumulate, despite changes in climatic and volcanic conditions.

Development plans . . . One thing Lake Kivu has in common with many other major gas finds is a lack of a major outlet.

No one knows for sure what proportion of the gas can be marketed economically. But the Belgian Government is studying commercial development with an eye to supplying gas for local cities.

In principle, gas production should be easy. Lower a tube, prime the well with a little air, and gas-enriched water rushes out as in a gas lift. Actual practice is more complicated. The marked difference in acidity of the two water layers causes an intense electrolysis which destroys a metal tube in a matter of hours.

Union Chimique Belge, which is helping the government experiments, is using a heavy pipe of 8-in. polyvinyl plastic in the trial well. This is hung from a small, doughnut-shaped steel float.

Bringing the gas to shore, separating it from the water, carbon dioxide and hydrogen sulfide also are problems. An inclined pipe from lake bottom to shore will be tried. Field equipment needed on shore may include a gas separator, simple scrubber tower, and an ethanolamine scrubber.

Aussies Push Hunt

. . . for oil in Papua. New stock offering planned.

AUSTRALIANS are taking on a larger share of the search for oil in Papua now that there has been some encouragement after more than 20 years.

Oil Search, Ltd., the minority shareholder in a three-company combine, said in Melbourne that it will raise $6.35 million in a new stock offering to its shareholders. The money will be used to increase Oil Search's interest in the Papua operation from 11 to 15%.

British Petroleum Co., Ltd., and Vacuum Oil Co., Pty., are the major owners of the two companies which have been carrying on an exploratory program in Australian New Guinea. The British and American companies had already announced they planned to withdraw from the operation unless they encountered something interesting in a well drilled at Puri.

The well tested 1,000 bbl. daily for several days before the operators began to have trouble with water encroachment (OGJ, Nov. 24, 1958, p. 61). G. B. Kater, Oil Search chairman, emphasized last week that the Puri well is not yet established as a commercial find, but it makes the Puri structure worth future tests.

Another similar structure at Bwata, 51 miles from Puri, will be drilled by mid-1960.

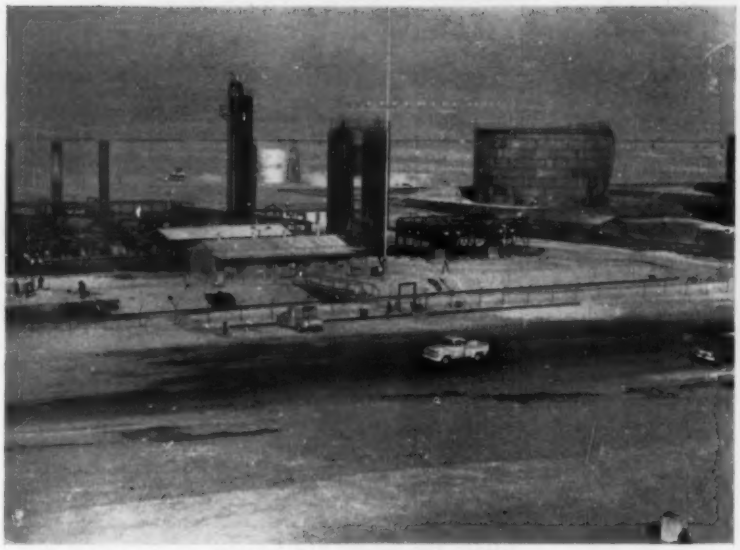
Gas to Feed Sumatra Plant

AN UNTAPPED gas zone in a south Sumatra field will be developed as a result of a newly signed agreement between Standard-Vacuum Oil Co. and the Indonesian Government.

Stanvac will develop a 400 to 600 ft. thick limestone gas formation in Radja field as a supply source for gas to be delivered to a proposed government owned urea fertilizer plant. Stanvac has drilled 35 wells through the gas horizon to a lower oil zone, from which it pulls 4,000 bbl. daily. The field was discovered in 1950.

The company has agreed to supply 5 billion cubic feet of gas per year for 20 years. The government wants to build a fertilizer plant of 100,000 tons per year capacity near Palembang and is seeking funds for the project from the export-import bank.

A 60-mile pipeline will be built by Stanvac to deliver the gas. The line will be built along the same right-of-way used by the company to transport crude to its Sungei Gerong refinery near Palembang.



Kuwait Has New 30,000-Bbl. Refinery

A BARE-bones refinery at Mena Abdulla, Kuwait, is the newest addition to Middle East processing facilities. American Independent Oil Co. is using the 30,000-bbl. plant chiefly to produce fuel oil from Neutral Zone crude for export and bunkers. The refinery is fed by a 12-in. pipeline from Wafra field. Arabian Bechtel Corp. built the plant, tankage, pumps, submarine pipelines, a tanker-loading pump station, and berthing facilities.

British Honduras Offers Land

. . . for oil-prospecting licenses. Area totals 5,600 sq. miles, with each permit covering about 200 sq. miles.

BRITISH HONDURAS is opening approximately 5,600 sq. miles of its territory to oil exploration.

The area, covered by Crown oil rights, is located principally north of the Maya Mountains in the Central American colony.

Applications for prospecting licenses will be accepted until May 31 by the assistant secretary, natural resources, Belize, B. H. Copies of the regulations and application forms also are available from the assistant secretary.

Lands being offered have been divided into 44 prospecting license areas. Most of the areas contain about 200 sq. miles each.

The terms . . . Prospecting licenses will be issued for an initial term of 4 years. They may be extended for an additional year.

Each licensed area will be subject to working obligations to be agreed on between the director of surveys and the licensee. Such obligations must include geological and geophysical surveys as well as test drilling.

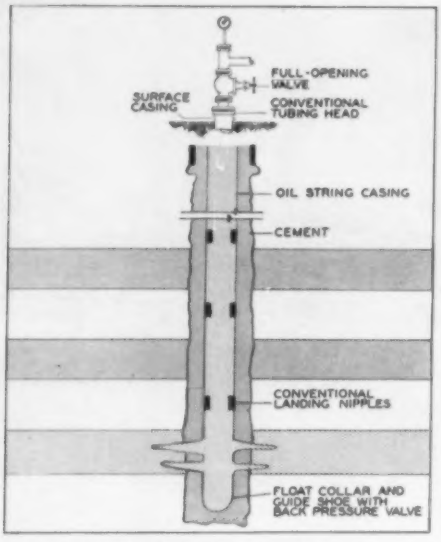
The minimum requirement will be the maintenance, after the first year of the license, of one drilling rig "in continuous operation" for each 1,000 sq. miles or fraction thereof held under license.

After the license obligations have been fulfilled, the licensee will be permitted to convert up to one-half of the area to a "mining lease."

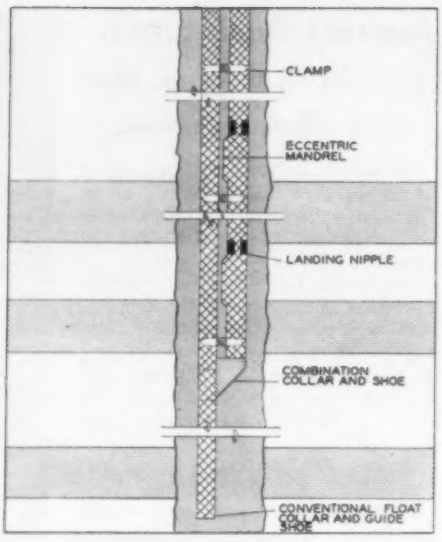
Such leases are to have an initial term of 30 years. They require no further working obligation but will be subject to rentals. The rental rate will increase from 50 cents per acre in the first year to $3 per acre annually, starting in the tenth year. The rent may be offset against future royalties.

Production will be subject to 12½% royalty.

Maps of the area being offered are available from the Crown agents, 1800 K Street, N.W., Washington 6, D. C.



SINGLE TUBINGLESS COMPLETION can be made without orienting perforating gun. Fig. 1.



DUAL TUBINGLESS COMPLETION requires perforating gun orientation for upper zone. Fig. 2.

How to save with tubingless

IT IS PRACTICAL and economical to use conventional tubing as casing in completing and servicing wells. Such wells can be produced, worked over, fractured, treated for sand consolidation, and artificially lifted. Too, such wells can be single or multiple completions.

Small casing sizes are adequate for the low production of most domestic wells. This technique of completing wells grew out of development of these things:

1. The permanent-type well completion.
2. Modified cements.
3. Through-tubing jet perforators.
4. Good perforating practice.

Basically, the tubingless completion is miniaturization applied to oil and gas wells. Wells are cased with pipe as small as 2⅞ in. o.d. In many cases, no inner string of tubing is necessary for production. This has caused the name, "tubingless completion." Except for size of the equipment, basic difference between the tubingless completion and conventional wells is the absence of an inner retrievable tubing string.

This article is a condensation of a paper originally titled, "Tubingless Completions," presented at Southern District meeting, API Division of Production, New Orleans, March 25-27, 1959.

The 2⅞-in. casing is not a limiting size, but experience shows this size allows some flexibility in the tools and techniques which can be used now. The 2⅞-in. casing makes all the money savings possible now with miniaturization.

When needed, a smaller inner string of tubing can be run inside the 2⅞-in. casing. There is artificial-lift equipment for production through this smaller tubing. Also, concentric-tubing workovers and servicing can be made through the 2⅞-in. casing.

Single tubingless completion . . . Fig. 1 shows a single tubingless completion. Equipment is essentially the same as that in conventional wells. Float collar, guide shoe with back-pressure valve, and other casing-cementing equipment are all commercially available in the 2⅞-in. size. Other optional equipment such as landing nipples have been field-proved in permanent-type completions.

There is good well control with the small-diameter casing. But, if desired, this can be supplemented by a small tubing string or by wire-line tools in conjunction with a lubricator and full-opening master valve.

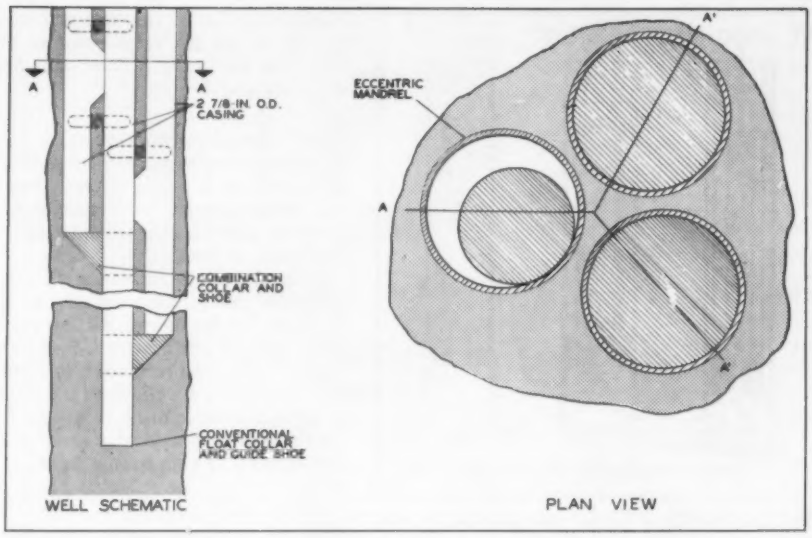
Sometimes it is necessary to be able to kill the well without pumping well fluid back into the formation. If so, a small tubing string can be installed. Or, the subsurface landing nipples may be included in the casing string; these allow complete well control by wire-line tools. This practice is widely used in permanent-type completions on conventional wells.

There are formation-evaluation tools available for small-diameter wells. Radioactivity and casing-collar logs can be run in 1½-in. tubing. Standard wellhead assemblies, which are common stock items, may be used. All of this equipment and that for well control are commonly accepted and available.

To perforate tubingless wells, there are 1⅞ and 2-in. steel-cased retrievable jet guns. These guns have enough penetration and hole size and they leave no debris in the hole after firing. Low shot densities, one and two shots per foot, have been used satisfactorily in both small-diameter and conventional wells.

Multiple tubingless completions . . . Multiple tubingless completions are versatile and save money. Fig. 2 shows a typical installation.

To date, the multiple completions have been run with one string carrying the load and with the other strings



TRIPLE TUBINGLESS COMPLETION means more trouble in perforating, with installation of eccentric mandrels, but it is much cheaper than the cost of three wells. Fig. 3.

BY C. B. CORLEY, JR.
AND J. L. RIKE
Humble Oil & Refining Co.,
Houston

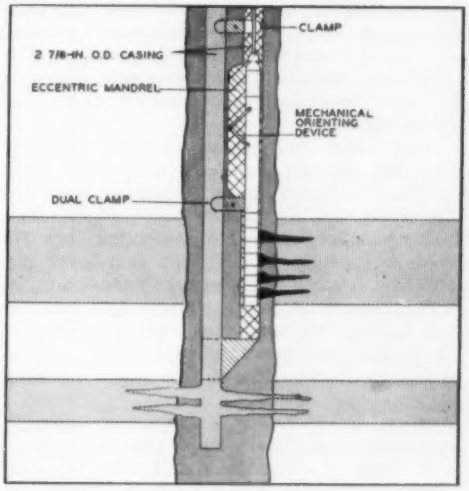
completions

attached as parasites. High-strength clamps attach the parasite strings to the load-carrying string. Dual blowout preventers give complete well control. On triple completions, Fig. 3, the collars on the third string are kept below the dual rams of the preventer except when raised to add joints.

Cementing is done through the longest string. In some cases it may be desirable to run one or both parasite strings without fillup in order to increase fluid capacity. However, differential fillup equipment may be used.

Other unconventional equipment on the multiple completions are combination collar shoes for each parasite string, multiple wellheads and casing hangers, small o.d. centralizers for the parasite strings, and orienting mandrels for perforating the parasite strings. All this equipment is available now or on short notice.

Directional perforating . . . Perforating the longest string in a multiple completion is no problem. It is done with conventional small-diameter guns. On the other strings a directionally fired steel-cased gun is used. This gun has two rows of charges spaced 30° apart. The casing string carries an eccentric mandrel above each interval



PERFORATING upper zone in a dual tubingless well is done with a mechanical orienting device working in an eccentric mandrel in the short string. Fig. 4.

to be perforated. Then, a mechanical orienting device, Fig. 4, directs the shots.

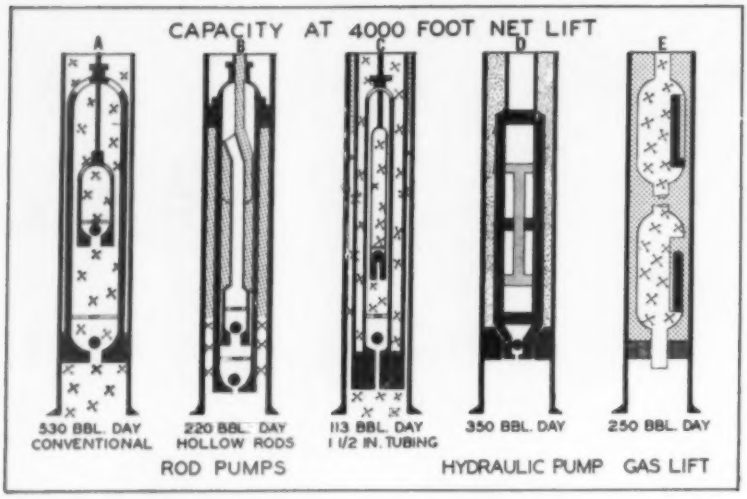
The orienting device is available through a service company. It has a spring-loaded arm which orients with the maximum eccentricity of the mandrel, thereby directing the shots in a certain direction. The basic principle is the mating of two eccentric members; or it might be called a slot-and-key principle. Electrical circuits at the surface show when the gun is oriented properly.

There is also a perforator available which uses no preplaced mandrels in the casing. Such a directional perforator would permit the multiple casing strings to be run independently.

Interconnecting port . . . There may be an interconnecting port between casing strings in a multiple tubingless completion. To separate the two casings while producing, a blanking sleeve can be used. To circulate between strings, the blanking sleeve can be removed by wire line.

Completions operations such as well stimulation and sand control can be done in the same manner as in single completions. Or, the interconnecting port can be exposed to allow circulation.

Stimulation and sand control . . . Production can be stimulated in tubingless wells with as much success as in conventional wells. In West and Southwest Texas, fracturing has been successful at rates as low as 9 to 14 bbl. per minute in both tubingless and



SEVERAL ARTIFICIAL LIFT METHODS are available to the operator using completions with 2½-in. casing. Fig. 5.

conventional wells. Results are in for 79 wells so fractured. Fracturing can be successful at low rates in tubingless completion if viscosity, fluid loss, etc., of the fracturing fluid are proper. There are commercial additives which improve these qualities of the fracturing fluid.

Preliminary field results indicate that water-wet sand has less tendency to screen out, making it possible to use higher sand concentrations.

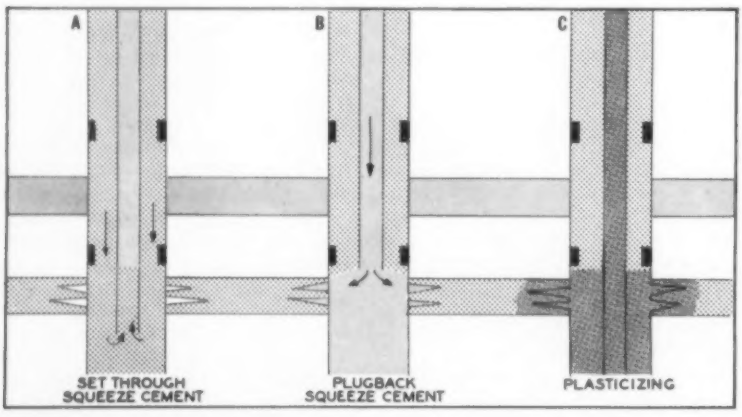
Sand-control methods have been used successfully in tubingless completions. A small tubing string in the well allows sand to be washed out and sand-consolidating plastic placed. In 51 jobs, this method of sand control had a success ratio of 82%.

Artificial lift . . . As Fig. 5 shows, well fluid can be artificially lifted over a wide range of volumes and well conditions. Capacities in Fig. 5 are for a net lift of 4,000 ft.

Several wells have been equipped with 1¼-in. tubing and pumped with small conventional pumps on ½-in. sucker rods. Other wells have been produced through hollow sucker rods. In such installations casing wear can be kept down by filling the annulus with oil and isolating it from the producing zone.

Wells with hollow sucker rods have also been produced with fluid rising up the annulus between rods and casing. This arrangement provides a vent for gas, permits circulation of corrosion inhibitors and of hot oil for paraffin control. This arrangement also keeps a lubricant in the annulus, thus reducing rod wear. For wells which produce large volumes of water, pump capacity can be increased by using full-size pumps on conventional rods.

Tubingless wells can be gas-lifted by running a 1¼-in. tubing string with small gas-lift valves. Hydraulic pumps may also be run on small tubing; these can lift large volumes of fluid and still leave a flow path for inhibitors and hot oil.



WORKOVER of single tubingless completions can be accomplished with a small pulling unit, using small tubing or wire-line tools. Fig. 6.

Single tubingless workovers . . . A tubingless completion may be worked over with small tubing or with wire-line tools. Choice of methods depends on which is cheaper for the particular job at hand.

A small pulling unit can work over tubingless completions cheaply using ¾, 1, or 1¼-in. tubing and low-pressure squeeze cementing. Fig. 6A shows a low-pressure squeeze job with small tubing on a well where the same or a lower zone is to be reperforated. As Fig. 6B shows, small tubing may also be used to plug back a tubingless well.

Should sand production become a problem, it can be washed from the well with tubing. Sand-consolidating plastics can be applied with the tubing.

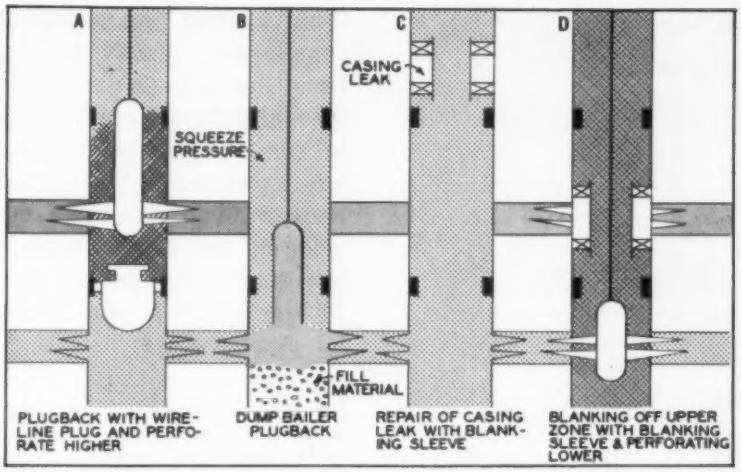
Casing leaks resulting from rod wear, corrosion, or the like may be repaired by squeeze cementing and reaming clean. These repair operations are the same in miniature as those on a conventional completion done by a pulling unit using the production string.

The tubingless completion may also be reworked with wire-line permanent-type completion techniques. At depths selected from logs, selective landing nipples may be placed in the casing string. While not necessary for production, these landing nipples are versatile for well control and workover. To plug back, wire-line tools can set in the nipple above the zone, a plug with a check valve for running in against fluid. Fig. 7A shows such recompletion by setting a wire-line plug and perforating higher. The plug can be removed by wire line if it becomes desirable to reenter the zone for testing.

If a cement plug is desirable the lower zone can also be plugged off by use of a dump bailer as shown in Fig. 7B.

As Fig. 7C shows, casing leaks can be repaired by setting a 1½-in. i.d. packoff sleeve. Future operations can still be done through this sleeve. The packoff sleeve can also blank off an upper zone so that a lower zone can be perforated for production. This is shown in Fig. 7D.

Multiple tubingless workovers . . . To work over a multiple tubingless completion, all techniques for single completions can be used if the orienting device is used for upper-zone perforating. If no interconnecting port is used, the workover will not disturb



SINGLE TUBINGLESS COMPLETIONS can be plugged back using a wire-line plug or cement. A blanking sleeve can be used to repair a casing leak or to blank off perforations. Fig. 7.

production from the adjacent completions.

If an interconnecting port is used, the same wire-line workover methods may be used as in a conventional permanent-type completion. The blanking sleeve is removed by wire line. Then, a wire-line plug is placed in the landing nipple below the interconnecting port on one string as shown in Fig. 8. A tubing extension can be suspended from the landing nipple above the port in the other string.

Fig. 8B shows use of a telescoping tubing extension to wash sand. Fig. 8C shows a low-pressure cement plugback.

A few problems in development . . . The interest in tubingless completions results largely from the success of through-tubing tools in permanent-type completions. However, tubingless wells were completed in Kansas in 1942. From 1950 to 1955, several hundred small-diameter injection and production wells were drilled in the Corsicana, Tex., water-flood operations. Others have completed wells with 2⅞-in. casing in Canada and elsewhere.

There were some problems in developing the current tubingless completion, but a satisfactory solution was found for each problem. On two early wells, there was trouble while cementing and cement had to be drilled from the lower portion of the production string. This problem was solved by cutting the down time to release the cement plugs and by using modified cement to avoid premature cement dehydration.

On pumping wells with hollow sucker rods, equipment was developed to eliminate the flexible piping from the top of the rods to the flow line. This equipment has operated satisfactorily, Fig. 9.

On one of the first multiple tubingless wells, the directional gun did not orient properly. It shot perforations in an adjacent string. These holes were isolated, however, with a sleeve having packing elements above and below. Most operations can be performed through the 1½-in. i.d. of the sleeve; if not, the sleeve can be retrieved if necessary.

The orienting device has been redesigned since to include more safety features. Also, the orienting mandrels are made to closer tolerances to avoid future trouble.

Some figures . . . One company has recently made 56 tubingless completions in Texas and Louisiana. Nineteen of these completions are accounted for by three triples and five duals. The 37 singles ranged in depth from 1,400 to 10,000 ft. Average savings for the singles was about 19% of conventional cost. In addition to the savings in steel, there was a saving in perforation density, fracture cost, and other items which might have been applied to conventional wells. Other operators have reported savings of the same magnitude.

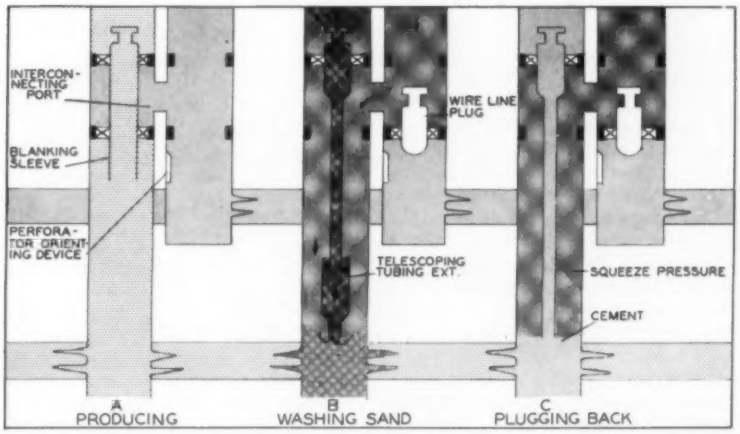
The multiple tubingless completions have been confined to the Gulf Coast and Southwest Texas at depths from 2,000 to 3,800 ft. Three triples and two duals have been made in the same field and in several instances the multiple completions jointly serve as producing and water-injection wells for separate zones. However, one triple well has been completed in three oil-producing zones. Three pumping units were set head-to-head for production from these three wells.

Drilling practice* . . . Many combinations of hole sizes have been tried in an attempt to find the most practical. Current practice is to drill a 6¼-in. hole below 7-in. surface casing or to drill a 6¾-in. hole below 7⅝-in. surface pipe. In some wells, hole size has been reduced to 5⅝-in. through the producing interval. This allows the perforators to shoot deeper into the formation from inside the 2⅞-in. production string.

Where possible, water has been used as the drilling fluid. Hole conditions in other areas make mud necessary.

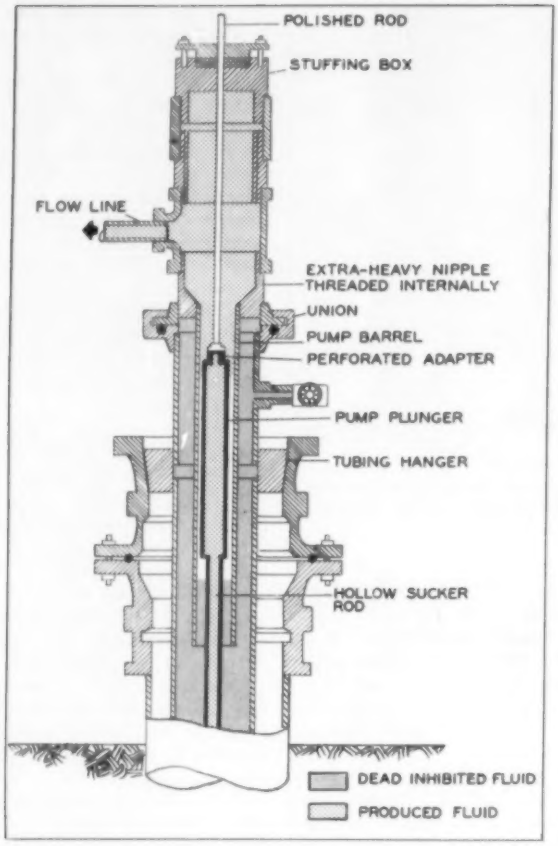
Total depths have ranged from 1,500 to 3,300 ft.

Cable tools have drilled some tub-



PERMANENT-TYPE WELL-COMPLETION TECHNIQUES can be used in servicing multiple tubingless completions. Fig. 8.

*This section adapted from "Tubingless Completions in the West Texas Area" by J. E. Willingham, presented at Southwestern District meeting, API, Midland, Tex., March 1959.



METHOD OF ELIMINATING flexible connections when using hollow sucker rods. Fig. 9.

ingless wells. Small portable rotaries drilled the others. On the rotaries, applied pump hydraulic horsepower ranged from 175 to 450. To take complete advantage of the technique, the rigs should be designed for slim-hole operations.

Most popular drill-pipe string has been 3½ in., but several other sizes and weights have been used. In the 6¾, 6¼, and 5⅝-in. holes, drill-collar size has varied from 5⅜ to 4¼ in.

Surface casing is set at the depth set out by the State Board of Water Engineers. This string uses a guide shoe and is cemented to the surface with 4% gel cement.

The 2⅞-in. string also carries a guide shoe and a float collar. Centralizers are used on each joint through the pay section; scratchers are used if the well is drilled with mud but not if the well is drilled with water. This string is cemented with 8% gel cement except for the pay section which is covered with neat cement.

On two early wells, there was trouble in cementing and it was necessary to drill out set cement in the lower portion of the 2⅞-in. string. This difficulty was eliminated by cutting the time spent in releasing the cement displacement plugs.

The casing head is low-pressure and is threaded for connection to the surface casing. Tubing is set in a slip-type tubing hanger and is secured with a cap-screw holddown.

What the future holds . . . As demand for tools and equipment in smaller sizes increases, they should become cheaper because of quantity manufacture and because of competitive development of new tools and services. There should be much greater saving in the long run in actual drilling. Thus far, there has been little reduction in the cost of drilling tubingless wells over the cost of drilling conventional wells.

"The interest in tubingless completions results largely from the success of small, through-tubing repair tools in conventional permanent-type completions. . . . There were some problems in developing the current tubingless completion, but a satisfactory solution was found for each problem."

References

1. Pistole, Harry and True, Martin E.: "A Challenge to the Operators and Designers of Oil-Field Equipment," ASME thirteenth annual petroleum mechanical engineering conference, Denver, Sept. 21-24, 1958.

2. Huber, T. A., and Tausch, G. H.: "Permanent-Type Well-Completion Developments," Drilling and Production Practice, 103 (1955).

3. Morgan, B. E., and Dumbauld, G. K.: "A Modified Low-Strength Cement," Trans. AIME (Petroleum Development and Technology), Vol. 192, 165 (1951).

4. Lebourg, M. P., and Hodgson, G. R.: "A Method of Perforating Casing Below Tubing," Trans. AIME (Petroleum Development and Technology), Vol. 195, 303 (1952).

5. Allen, T. O., and Worzel, H. C.: "Productivity Method of Evaluating Gun Perforating," Drilling and Production Practice, 112 (1956).

6. Tausch, G. H., and McDonald, Price: "Permanent-Type Completions and Wire-Line Workovers," Petroleum Engineer, Vol. 28, No. 10, B-39, Sept. (1956).

7. World Oil: Permanent-Type Well Completions, Vol. 138, No. 4, 168 March (1954).

8. Willingham, J. E.: "Tubingless Completions in the West Texas Area," paper No. 906-4-C presented at the spring meeting of the Southwestern District, Division of Production, Midland, Tex., March 4-6, 1959.

9. Ibid.

10. Tausch, G. H., and Corley, C. B., Jr.: "Sand Exclusion in Oil and Gas Wells," paper No. 926-3-D, presented at the spring meeting of the Southern District, Division of Production, Feb. 26-28, 1958, to be published in Drilling and Production Practice (1958) (in press).

11. Goeken, R. J.: "Report on the Methods of Concentric Tubing Workovers," paper No. 926-3-B, presented at the spring meeting of the Southern District, Division of Production, Feb. 26-28, 1958, to be published in Drilling and Production Practice (1958) (in press).

12. Tausch, G. H., and Corley, C. B., Jr.: op. cit.

13. Tausch, G. H., and McDonald, Price: op. cit.

14. Toelke, L. W.: "Plug Back Casing Without Removing Tubing," Petroleum Engineer, Vol. 30, No. 13, B-91, Dec. (1958).

15. Midland Reporter-Telegram, Midland, Tex., March 24, 1958.

16. Enright, Robert J.: "They're Really Slim at Corsicana," The Oil and Gas Journal, Vol. 54, 160, Sept. 26 (1955).

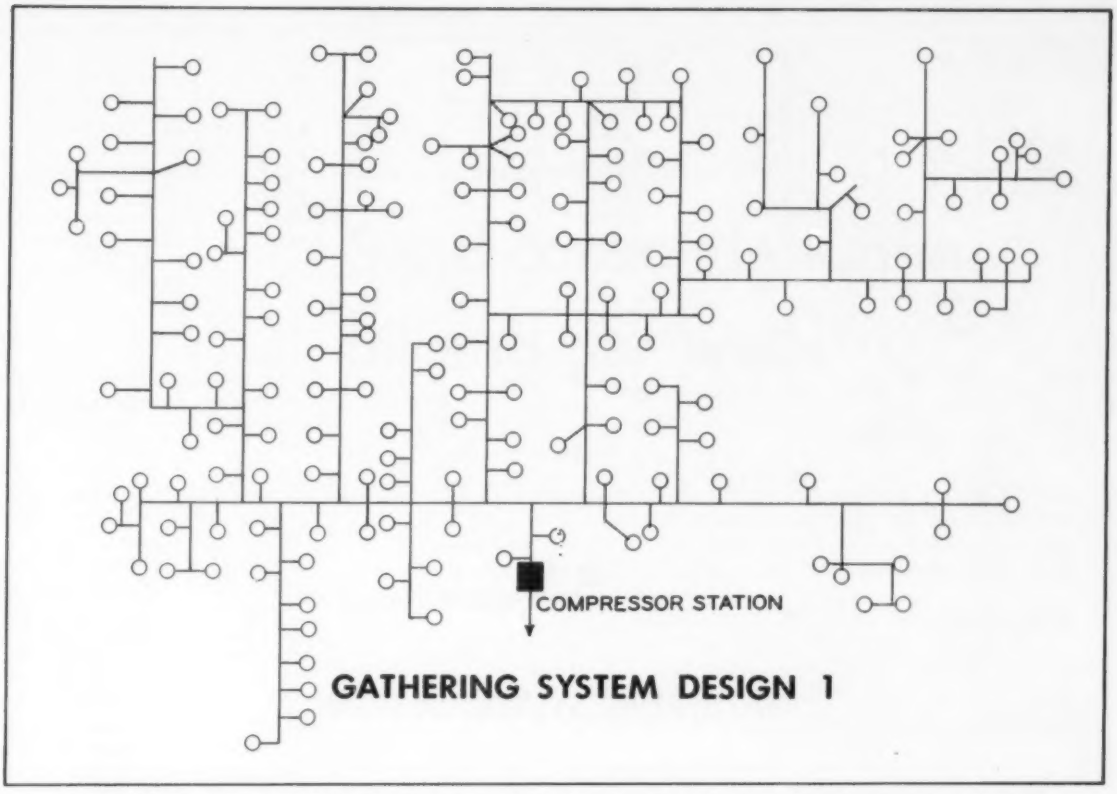
17. Petroleum Week: "What's New in the Industry," 16, May 17 (1957).

18. Willingham, J. E.: op. cit.

19. Petroleum Week, "Here, Tubingless Triple Completions," Vol. 7, No. 21, 17, Nov. 21 (1958).

20. Stekoll, M. H., and Hodges, W. L.: "Use of Small-Diameter Casing Reduces Well Costs," World Oil, Vol. 148, No. 2, 70, Feb. 1 (1959).

21. The Oil and Gas Journal: "Humble Has New Completion Method," Vol. 56, No. 46, 136, Nov. 17 (1958).



THREE MAJOR SPUR SYSTEMS feed into a network of three loops in this typical gathering-system design.

Computer evaluates design of gas-gathering system

BY L. R. HENRY AND R. B. PERITZ
Colorado Interstate Gas Co.

Here's a method to determine the pressure distribution in a natural-gas gathering system using a high-speed digital computer and the Hardy Cross iterative technique.

THE PROBLEM of determining pressures in a gas-gathering system is of continuing interest in the natural-gas industry, and in the past has proved to be very troublesome.

The use of a high-speed digital computer in solving this problem has now been proved practical, and can be considered a common engineering-department procedure rather than a developing technique in research.

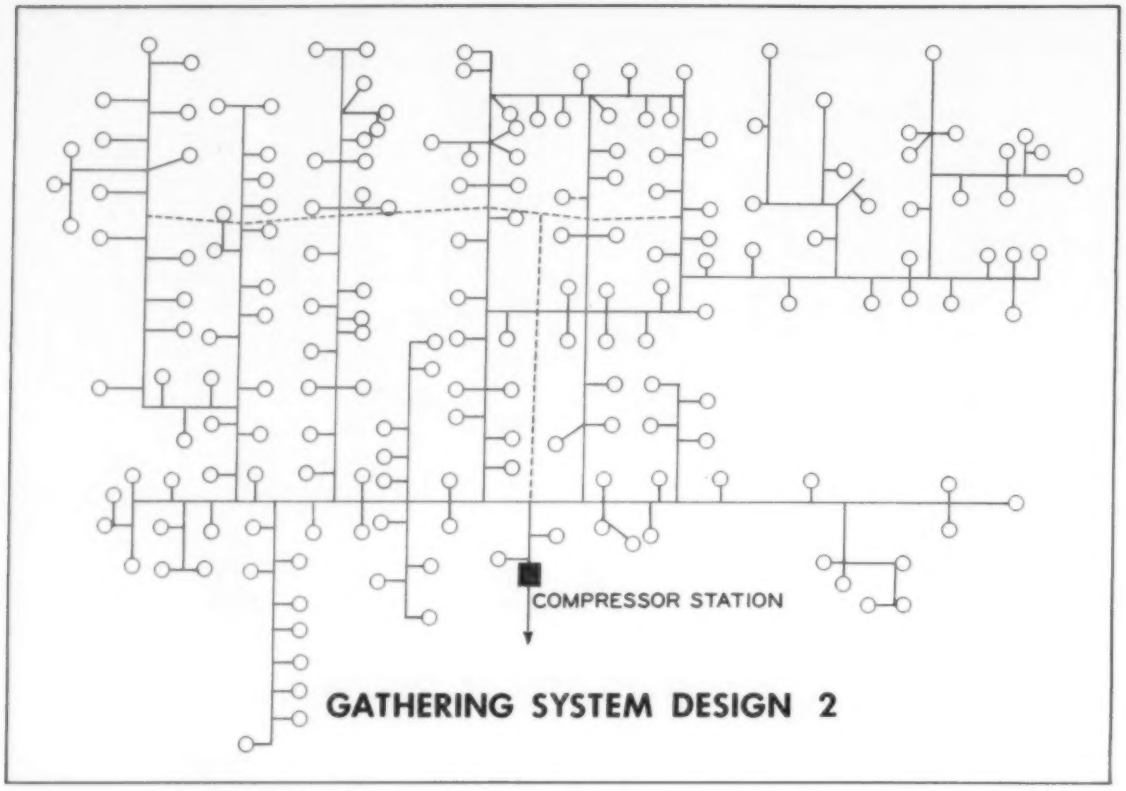
A natural-gas-field gathering system consists of the network of pipelines which collect gas from individual wells in a natural-gas field, and transports the gas to one or possibly to several central points for delivery to a main-line transmission system. Gas wells are usually placed one on each 640 acres; the field served by a gathering system may include several hundred wells. Field compressors are an integral part of the system, and are used to boost the gas through the pipelines, where necessary.

The network can consist of an almost infinite combination of arrangements of locations or routes. These can all be resolved into individual well lines, branch or lateral lines, and looped circuits. A loop as used here means a tieover between branch lines, and not a parallel line as it is sometimes used. A looped circuit is seldom installed as original construction. Frequently, as a gas field develops in unexpected directions, or as certain wells fail to fulfill earlier expectations, a loop circuit is as very economical improvement to an existing system.

Design Problem

The design problem consists of selecting the location and sizes of pipeline sections and field compressors. Because there are so many possible routes for the parts of a gathering system, it appears that a specific design technique cannot be developed, and the problem of design resolves into a study of cases. A trial network design is laid out, the pressure distribution is evaluated, compressor facilities are selected, and finally the cost of service is estimated. The entire process is repeated for another trial design or variation, and another, until the designer achieves a "satisfactory" plan.

The problem of the pressure distribution is straightforward enough in a simple branched lateral system, but in a network involving several loops,



LARGE LOOP LINE across the entire field is incorporated into this design.

tedious trial-and-error or iterative techniques are required. It has been found that a partly looped system serving about 200 wells requires about one man-week to fix the pressure distribution. Thus only rarely has the "study of cases" for the entire field been carried beyond a few trials, and it has often happened that a better plan could have been devised.

By the use of high-speed computing machines, the pressure-distribution problem can be solved readily; it has been found that a 200-well design can be reduced to punched cards, processed through the computer, and the results interpreted, in 4 hours. Thus, the designer can investigate a large number of variations and is more likely to attain the most economical design.

Study of Cases

The analysis is based on the Panhandle flow formula. The looped portions of the gathering system are solved by the iterative method developed by Hardy Cross. The method employs Kirchhoff's law of networks: the net flow at a junction is zero and the algebraic sum of friction drops around a closed circuit is zero.

A flow pattern is assumed in each loop, with the restriction that the inflow to any junction must equal the outflow. In general, the head losses due to the assumed flow will not equal zero, and a correction is applied. The correction is calculated as follows: In a loop of several sections

$$\Sigma\Delta P_1^2 = A_1 L_1 Q_1^n = O$$

$$\text{Set } Q_1 = Q_1 + Q$$

$$= Q_1^n + nQ_1^{n-1}\Delta Q + \frac{n(n-1)}{2!} Q_1^{n-2} (\Delta Q)^2 + \dots$$

Neglect squares and higher powers, solve for ΔQ

$$\Delta Q = \frac{-\Sigma\Delta P_1^2}{\Sigma A_1 L_1 Q_1 n} = \frac{-\Sigma\Delta P_1^2}{\Sigma R_1} \qquad (1)$$

The sign of each P_1^2 is the same as the sign of Q_1, where clockwise is the positive direction; each R_1 is positive, regardless of the sign of Q_1.

The correction ΔQ is computed for each loop, and added to the flow in each section of the loop. If a section is part of two loops, its flow is adjusted by ΔQ from both loops. Each loop is corrected, then the process is repeated. The correction ΔQ becomes smaller with each iteration, until it becomes sufficiently close to zero that the system is considered balanced.

This iterative technique has been used successfully with highspeed computing machines by a number of investigators. All of these, however, used formulas where $n = 2$. As far as is known, this is the first time where an iterative technique using a nonintegral exponent has been employed. The term Q^n is computed by Taylor's series:

$$Q^n = Q_o^n + Q_o^{n-1} (Q - Q_o) + \frac{n(n-1)}{2!} (Q-Q_o)^2 + \dots \qquad (2)$$

$$= A_o + A_1 (Q-Q_o) + A_2 (Q-Q_o)^2 + \dots A_k (Q-Q_o)^k + \dots$$

where Q_o is an arbitrary volume for which corresponding values for the constants A_1 are stored in the machine. The large part of the machine devoted to computing Q^n limits the size of network which can be analyzed on a single pass through the machine.

The pressure distribution is found in four IBM machine programs: summing volumes or preparing input data, calculation of ΔP^2 in loop sections,

and calculation of required pressure at the outlet for each wellhead pressure.

Preparing the input data consists of accumlating the volume from successive wells and minor laterals, accounting for the input and output at each junction. The machine automatically accumulates these totals and prepares one card for each lateral and loop section showing the section identification, dimensions, and volume. The lateral program computes ΔP^2 for each lateral section; the loop program adjusts the flow around each loop until $\Sigma\Delta P^2$ around the loop is zero.

A card is punched for each lateral and loop section, showing the identification, dimensions, adjusted volume, ΔP^2 and ΔP^2/mile. Finally, the well program computes ΔP^2 for each well line, accumulates $\Sigma\Delta P^2$ between the well and the field outlet along a specified route, and computes the required outlet pressure based on the wellhead pressure and the total drop to the outlet.

Two typical gathering-system designs are shown to demonstrate the technique. Design No. 1 consists of 204 miles of pipeline serving 181 wells, totaling 240,000 M.c.f. daily. The gathering system is arranged into three major spur systems, feeding into a network of three loops.

The output is taken from the loops by a single spur to a compressor station. The station inlet pressure is 161.8 psi. Design No. 2 has a large loop line across the entire field. For the same well data, it is found that the station pressure is now 187.5 psi. For both designs, minor changes in one or two small spurs or well lines will increase the station pressure 20 to 30 psia.

Computer Application, Results

The several programs for the IBM 650 computer have a combined limit of 1,000 total sections, whether lateral or loop, and a maximum of 498 loop sections arranged in not more than 46 loops. This is more than adequate for most gathering systems. There is no explicit limit on the number of wells possible to make up a field, though usually there is an average of one section for each well.

This method is applicable to the evaluation of either a new design or of improvements to an existing design. The application of machine-computing techniques to the analysis of a gathering system is a long step toward the machine analysis of an entire natural-gas system from well to consumer.

From paper presented at ASME Petroleum Mechanical Engineering Conference, Denver.

PRODUCTION

Here's an improved method of

Sand consolidation in oil and gas wells

Here's why...

1. Laboratory results and field experience have demonstrated that an improved plastic technique effectively consolidates loose sands. This technique employs a catalyst preflush, a phenol-formaldehyde plastic solution, and a cresol-oil overflush.

2. In field operations, loose sands can be consolidated by this technique in about 24 hours without the use of a rig.

3. This sand-control technique has been used on a routine basis to treat more than 40 intervals in sand-problem wells. Slightly more than 80% of the treatments have been successful.

BY J. H. EDWARDS, R. E. WILLIAMS, AND C. L. PROKOP
Humble Oil & Refining Co., Houston

USE OF PLASTICS as a means of controlling sand production was tried about 15 years ago. Although a large number of jobs were done successfully with plastics, they never found general acceptance. This was primarily because of mechanical difficulties involved in their placement. To insure uniform injection, it was necessary to keep the perforations free of mud cake. Ideally, nothing except oil or clear salt water should contact the formation prior to or during the injection of plastic mixtures. Therefore, the main problem centered around the requirement that the well must be kept under control during the workover without the use of mud. In addition, it was usually necessary to move a rig onto location to do a plastic consolidation job.

With the advent of permanent-type well-completion techniques[1] it became possible to control the well and to perform most workover operations using clear salt water or oil without the use of a rig. This development in workover procedure, coupled with the increasing production from sand-problem areas in southern Louisiana, prompted a renewed interest in plastics for the control of sand production.[2]

Article adapted from "An Improved Technique for Consolidating Sand in Oil and Gas Wells" which was presented at the API Division of Production Southern District meeting in New Orleans, March 27, 1959.

Laboratory Investigation

The requirements for an ideal plastic to consolidate sands have been discussed by Cardwell[3] and by Wrightsman and Spain.[4] They showed that the plastic should: (1) wet the sand and displace the connate water; (2) separate into two phases—a solid phase to bond the sand, and a liquid phase to insure permeability; and (3) allow control of hardening time under well conditions. Phenol-formaldehyde plastics catalyzed with stannous chloride were found to meet all these requirements.[5] The laboratory work described herein was done to improve the application of phenol-formaldehyde plastics and to give support to a program of field utilization of these plastics. Work was directed toward reducing the time required to perform a sand-consolidation job while still insuring a high probability of success.

The laboratory tests were made on clean, graded Ottawa sand or field sand packed into 1½-in. i.d. glass columns. The sand-packed columns were saturated with water containing 10% salt to simulate connate water. Each column was then flushed with diesel

fuel until the sand had a low water saturation.

Once the column was prepared, it was placed in a constant-temperature bath, and the sand in the column was consolidated by the method being investigated. After consolidation, the columns were removed from the bath and tested.

Preflush . . . It is known that many formation sands react to some degree with the stannous chloride catalyst contained in the phenol-formaldehyde plastic composition. Therefore, each test column was preflushed with about one pore volume of an aqueous solution of stannous chloride to insure that the catalyst later injected with the plastic solution would be effective. Stannous chloride gives a turbid solution when added to water. To prevent possible clogging of the sand face by the preflush solution, hydrochloric acid was added to the stannous chloride solution until it cleared.

Plastic composition . . . The plastic composition contains formalin, a phenol-cresol mixture, and stannous chloride. It separates into two phases: a solid phase which cements the sand grains together, and an inert aqueous phase which fills most of the pore space between the cemented grains. The amount of solid phase depends upon the ratio of the phenol-cresol mixture to the total plastic volume. In these tests, two parts of formalin and one part of phenol-cresol mixture were used. This composition was considered to be enriched because it produced a larger proportion of solid phase than was obtained with the composition developed previously by Wrightsman and Spain.[4]

The composition of the phenol-cresol fraction was adjusted to give the desired phase separation time and hardening time. Cresol produces a fast-reacting plastic, whereas phenol produces a slower-reacting plastic. The correct compositions were determined by laboratory experiments for a wide range of formation temperatures.

Overflush . . . During the injection of the plastic in a field well, a small amount of the placement fluid inevitably flows into the formation just behind the plastic. It was decided, therefore, to do the laboratory testing by intentionally injecting a controlled amount of a specially prepared placement fluid, hereafter called "overflush." The overflush was diesel oil which contained a small amount of cresol.

Injection and waiting time . . . The consolidation treatment was begun by injecting the preflush into a sand column which was immersed in a constant-temperature bath. Then one stage of the plastic solution was injected, and a small overflush was flowed through the column. Some experiments were stopped at this point, and the plastic was allowed to harden for 24 hours. In most experiments, 1 to 3 hours after the injection of the first stage of plastic, a second stage was injected. The second stage was followed by another overflush. Then the column was allowed to age for 24 hours.

In the field a period of 18 hours is usually allowed for the plastic to harden before the circulation of salt water is begun. To investigate the possibility that this period could be reduced without endangering the success of the treatment, experiments were conducted in the same manner as those just described, except that, at various time intervals after the final stage of plastic was injected, a 10% sodium chloride solution was flushed through the column. Twenty-four hours after the final plastic injection, the columns were removed from the bath and tested.

The effectiveness of the sand-consolidation treatments was determined by making compressive-strength measurements and, in some cases, by making permeability tests on a 1-in.-diameter plug cut from the columns.

Results . . . Laboratory results, presented in Table 1, show that a one-stage treatment gave good consolidation of a clean Ottawa sand, but a two-stage treatment was needed to get good consolidation of Miocene sand from a field well. Also, for successful consolidation a preflush was required for the field sand. Compressive strengths ranged from 89 to 1,140 psi. after treatment. The test column that was flooded with salt water 8 hours after treatment was firmly consolidated. When cresol was added to the diesel oil for overflushing the column, the consolidated mass was stronger than when no cresol was added to the diesel oil.

In experiments not shown in the table, attempts to consolidate sands containing carbonates equivalent to more than about 0.7% by weight calcium carbonate were unsuccessful because the carbonate reacted with the acidic catalyst. Fortunately, loose sands seldom contain as much as 0.7% by weight carbonates.

Field Application

Consolidating technique that was developed in the laboratory and improved as a result of field experience are discussed separately in this section of the paper. This general procedure was modified slightly to take care of differences in the characteristics of each well.

All the wells treated were completed through perforated casing by the permanent-type completion method. The thickness of the producing intervals which were treated ranged from 5 to about 25 ft. The reservoir temperatures ranged from about 120° to 180° F.

Preparation of wells . . . Plastic treat-

TABLE 1—RESULTS OF SAND-CONSOLIDATION TESTS

Experiment No.	Sand used	Consolidation treatment at 130° F.	Compressive strength, psi.	Permeability, md.
1	Ottawa	Preflush, one-stage rich plastic, overflushed with diesel fuel containing cresol	1,140	1,160
2	Friendswood, Miocene	Preflush, one-stage rich plastic, overflushed with diesel fuel containing cresol	Sand remained unconsolidated	....
3	Friendswood, Miocene	Preflush, two stages of rich plastic, 1-hour wait between stages, overflushed with diesel fuel containing cresol	585	....
4	Friendswood, Miocene	Preflush, two stages of rich plastic, 3-hour wait between stages, overflushed with diesel fuel containing cresol	715	1,320
5	Friendswood, Miocene	Same as No. 4, except no preflush	Sand remained unconsolidated	....
6	Friendswood, Miocene	Same as No. 4, except flushed with salt water 8 hours after second stage	637	1,270
7	Friendswood, Miocene	Same as No. 4, except no cresol added to diesel fuel for overflushing	89	700

Note: Tests on consolidated samples made 24 hours after last plastic injection.

ments were made either immediately after the wells were perforated or after they had been washed to clean out sand. In all wells except one, salt water was used as the circulating and perforating fluid. After the wells were perforated, a 1-in.-diameter extension pipe was positioned just below the perforated interval. The salt water was displaced with diesel fuel or crude oil. The pressure and rate at which the formation would take fluid was established by squeezing some of the oil into the formation at a constant, slow rate until a uniform pressure was measured. Care was taken not to break down the formation at this point. After a rate of injection was established, mixing of the chemicals was started at the surface.

Preparation of chemicals . . . All the chemicals used—preflush, plastic solution, and overflush—were mixed on location. To prepare the preflush, stannous chloride was slowly added to several barrels of water in a mixing tank, and hydrochloric acid was added to clear the solution. The preflush volume was chosen to equal the volume of plastic solution to be used in a single stage. It was spotted in the perforated interval by volumetric displacement and was squeezed into the formation at about the rate used when injecting oil during preparation of the well. Next the plastic solution was prepared.

The composition chosen depended upon the desired separation time and the well temperature. The composition was selected so that the plastic solution could be displaced into the formation before the solution separated into two phases. The volume of plastic solution used for each stage was either 4 gal. per perforation or a total of 6 bbl., whichever was greater. Prior to mixing the plastic solution, the mixing tank was thoroughly cleaned. First, the formaldehyde was placed in the mixing tank, then the phenol and cresol were added. The mixer was started, and the stannous chloride was added. After about 10 minutes of agitation, the plastic was ready for use.

The cresol-oil overflush was prepared at any convenient time, either before or during plastic preparation. It was made by adding a small amount of cresol to diesel fuel. The overflush volume was kept as small as possible.

Injection of plastic solution . . . When the mixing was completed a portion of the cresol-oil overflush, all the plastic solution, and the remainder of the overflush were pumped into the well. The leading portion of the overflush was pumped out the tubing and up into the annulus to a position just above the perforations. The plastic was spotted in the perforated interval and was squeezed into the formation at about the same rate as the preflush. Next, the overflush was pumped into the plastic-containing formation sand by pumping first on the tubing, then on the casing, and finally on the tubing again. This procedure was followed so that no plastic remained in either the casing or the tubing. The well was shut in and allowed to stand for 3 hours. In all these operations care was taken not to break down the formation.

At the end of this time oil was again pumped into the formation to be sure that it would take fluid. After an injection rate was established, a second stage of plastic, identical to the first, was prepared and squeezed into the formation. A second preflush was not used, but a cresol-oil overflush was used as before. After the injection of the second stage was completed, the well was shut in for a minimum time of 12 hours.

At the end of the shut-in period, the well was circulated with salt water, and the extension pipe was removed. If this operation occurred earlier than 24 hours after the second stage of treatment, precautions were taken to prevent flow from the formation into the well bore. Twenty-four hours after the second stage of treatment, the well could be tested and put on production.

Field results . . . The sand-consolidation technique described has been used to treat more than 40 intervals in wells in Texas and Louisiana. All treatments were made in wells completed in sand-problem formations. The treatments were judged to be successful if the wells produced essentially sand-free oil after they were treated. The success ratio for these treatments has been slightly above 80%.

All the chemicals used in the plastic are hazardous. If taken internally, they are poisonous. On external contact, stannous chloride or formaldehyde solution may cause considerable skin irritation. If either phenol or cresol contacts the skin, severe burns may result. To protect personnel from any mishap, suitable protective clothing and equipment are used.

References

1. Huber, T. A., and Tausch, G. H.: Permanent-Type Well Completion, Trans. AIME (Petroleum Development and Technology), Vol. 198, 11 (1953).

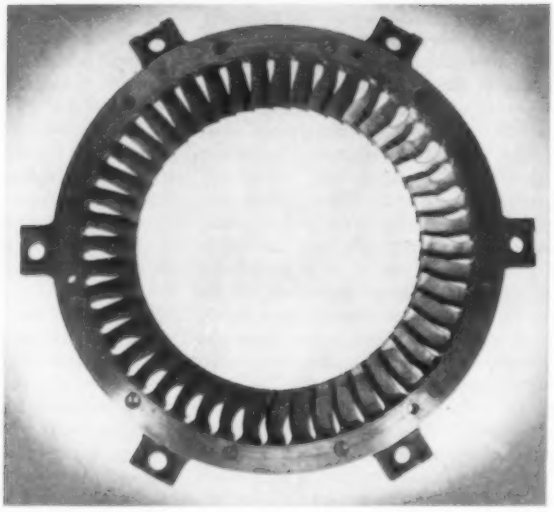
2. Harper, George: Controlling Sand in Gas Wells, Petroleum Engineer, Vol. 30, No. 11, B-78, December (1958).

3. Cardwell, P. H.: Plastic Use to Consolidate Incompetent Formations, J. Petroleum Tech., TP 2148, Vol. 10, No. 2, March (1947).

4. Wrightsman, G. G., and Spain, H. H.: Consolidation of Sands in Oil and Gas Wells, The Oil and Gas Journal, Vol. 46, No. 11, 73, July 19 (1947).

5. Method of Consolidation, U. S. Patent 2476015, other applications pending.

New catalytic and alkylation units have been placed on stream at Leonard Refineries, Inc., Alma, Mich. The 7,500-bbl. fluid cat cracker is at left in the photo. The HF alkylation unit (right) is designed to produce 1,100 bbl. per day of alkylate for motor-fuel blending. Leonard also has recently completed a 43-mile pipeline from Alma to Lansing and a 140,000-bbl. products terminal at Lansing.



TURBINE NOZZLE BLADES after 800 hours of operation. No external separator ahead of turbine. Fig. 2.

4,000-hour test proves feasibility in several applications for cat cracker service of

Power-recovery gas turbines for

By J. C. DYGERT
Shell Development Co.,
Emeryville, Calif.

IF GIVEN the right job, the "gas turbine"* reigns supreme; no other system can match the efficiency or low equipment cost. In fact, no other type of prime-mover equipment is mechanically acceptable. We refer to systems in which one or more portions of the gas turbine's cycle—compression, combustion, expansion—can become an integral part of a complex process.

*In this article the term "gas turbine" refers to any reasonable combination of aerodynamic compressors and turbines with suitable means to provide the necessary temperature ratios for the working medium of the cycle.

A telltale sign of such a process is large volumes of high-temperature expanding gases passing through a throttle valve. Potential users are available in oil refineries, some chemical plants, and the steel industry.

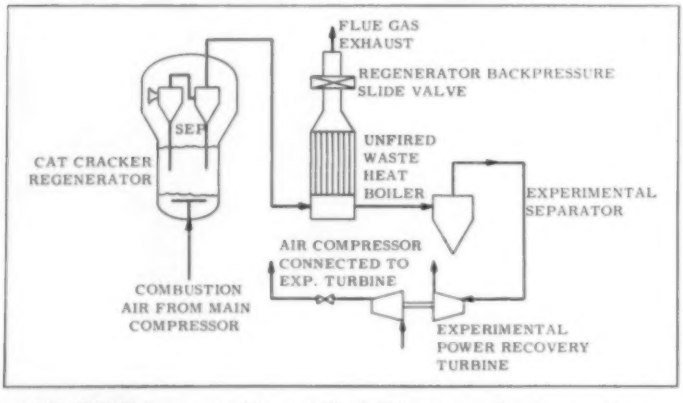
Of interest in these various processes from the gas turbine's point of view: an oxidation (or reduction) step which usually is carried out at an elevated pressure. However, the turbine shows a decided aversion to the cantankerous character of the products resulting from some of these processes.

In some cases, the recoverable work in a unit of fluid is too small to be of real value; in others, the off gases have an affinity for turbine blades to such an extent that the blades get carried away with the expanding gases. This misappropriation takes place over a period of time and may be caused by corrosion, erosion attack, or both.

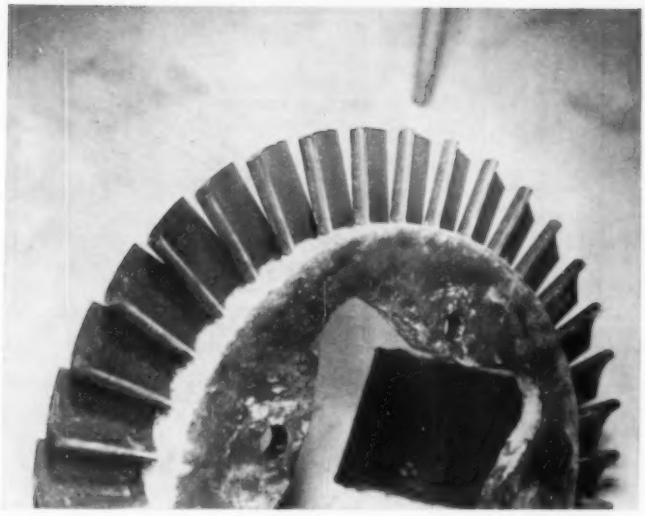
Short life justified . . . The exceptional profitability of recovering energy from certain of these difficult waste streams warrants assigning a short equipment service life. If the mechanical equipment of the system can be designed to operate over the specified period, it becomes feasible to consider throwing away the parts subject to wear before safe operation is jeopardized. Periods between replacement usually are governed by the process run length which dictates the required turbine service life.

A prime area open for this type of exploitation is the fluid-bed type of process. Examples are fluid catalytic cracking units in oil refineries and the direct reduction of iron ore in fluid beds. In these systems, turbine-blade wear stems from erosion; fine particles escaping from the fluid bed are the culprits.

Certain characteristics prevail in these operations: a bed of small-sized



TEST STAND for gas turbines at Shell Oil's Montreal refinery. Fig. 1.



TURBINE STATOR or nozzle blades after 4,000 hours of operation. Blades had worn very little. Fig. 3.

fluid-bed processes

particles is fluidized with some medium; depending upon the nature of the particles, a second reducing or oxidizing medium is introduced; the products of the reaction contain some uncombusted gas (more on this later); the pressure and temperature of the flue gas combine to yield energy release by expansion.

(While the supercharged steam boiler fired with coal does not include a fluid bed, it is another example of the difficult-to-handle "waste" stream in which power recovery turbines may be used.)

Test Program

Before one can cash in on the recovery of energy from the regenerator flue gas of a fluid cat cracker, the main obstacle, catalyst erosion of the turbine blades, must be overcome. This was done in a test at Shell Oil of Canada's East Montreal refinery.

A total of 4,000 hours of operation has shown that a special separator can remove enough of the catalyst particles from the flue gas to prevent any serious erosion of the turbine blading. The separator also displayed no serious erosion damage. (Incidentally, the efficiency of separation on an over-all weight basis is sufficiently good to be of interest for cat crackers located in air-pollution-control districts.)

The success of the test program at Montreal hinged on the joint efforts of three groups. The Emeryville research center of Shell Development Co. was responsible for starting the project as well as preparing the test design and directing operations at the refinery. Elliott Co. designed and loaned the turbocompressor and associated equipment and gave engineering assistance.

Personnel at Shell Oil of Canada's East Montreal refinery made available their catalytic cracker facilities, installed the equipment, and provided operational supervision and guidance.

Test facilities . . . For a description of the Montreal test facilities, see Fig. 1. Here, a slip stream of about 10% of the total regenerator flue gas was withdrawn through a nozzle in the plenum upstream from the tubes of the waste-heat boiler. After being relieved of the major share of catalyst particles by the separator, the flue gas expands through a turbine and exhausts through a stack to the atmosphere.

The shaft horsepower developed by the turbine is absorbed by a compressor which, although capable of delivering air to the process, was used merely as a brake in the test setup.

The necessity of the separator was demonstrated by the results of an earlier investigation. In 1950 Elliott Co. conducted a test program at a refinery in Illinois using an arrangement similar to that at Montreal, but minus the separator. The nozzle blades from this turbine after about 800 hours of running time are shown in Fig. 2. Quite clearly, the useful life of the turbine is over, and 800 hours hardly can be considered a reasonable service life.

The minimum goal of a development project would be to increase the service life tenfold. This early test provided the background from which one could predict the chances for success of other systems.

By comparison with Fig. 2 the evidence of success at Montreal is shown in Fig. 3. After 4,000 hours these turbine nozzle blades could be exchanged for new ones without telling the difference.

The experimental turbine was treated in a manner similar to any other piece of cat cracker equipment. It was exposed to plant upsets including regenerator afterburning and extremely high and abnormal catalyst loss rates—up to 15 tons per day. It received only nominal attention by cat cracker operating personnel; entries in the log were made every 4 hours and consisted of the usual items—lube-oil pressures, temperatures, etc. Thermodynamic data were logged once per day.

Test Severity

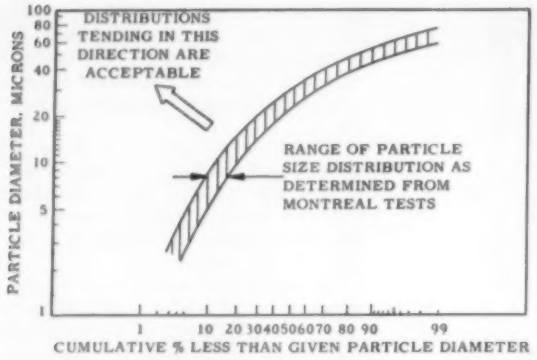
The severity of conditions leading to erosion in the turbine is best measured by the average catalyst mass velocity, 0.66 tons per day per sq. ft. during the Montreal test. This number is based upon the slip stream's prorated share of the average catalyst loading of the regenerator exit flue gas (upstream from experimental separator) and upon the annulus area of the turbine nozzle blades (the flow frontal area of the turbine).

At East Montreal the flue-gas catalyst concentration upstream of the test separator (average for 170 days of test turbine operation) was 1,300 p.p.m. on a weight basis. This is derived from an average loss of 3.1 tons per day based on over-all plant catalyst inventories, and regenerator combustion air flow rates of 31,000 to 40,000 s.c.f.m.

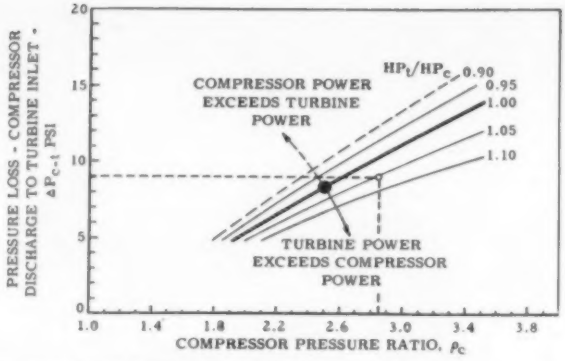
Power recovery gas turbines may be advantageously applied to a cat cracker if the catalyst mass velocity, as defined, is in the neighborhood of 1 ton per day per sq. ft.[2] or less.

Implicit in this mass-velocity prerequisite is a stack-fines particle-size distribution similar to the range presented in Fig. 4. (In order not to be misleading, "isokinetic"* collection of catalyst samples and size measurement ought to be carried out using a

*Isokinetic in the text refers to withdrawing a sample of gas at a velocity equal to the local velocity of the gas in the duct.



PARTICLE-SIZE DISTRIBUTION in the stack fines must conform to this pattern. Fig. 4.



EFFECT OF SYSTEM PRESSURE DROP on turbine-compressor power ratio. Fig. 6.

technique comparable to that used at Montreal.)

The amount of a given size of catalyst reaching the turbine is fixed once the amount and size distribution of the solids at the regenerator exit are specified.

Waste energy recovery . . . That regeneration in catalytic cracking processes releases large amounts of energy has long been recognized. The early fixed-bed Houdry units made use of power-recovery turbines, compressors, and electric generators to regain energy of the flue gas. Fluid catalytic units have employed unfired waste heat boilers and more recently CO-burning boilers.

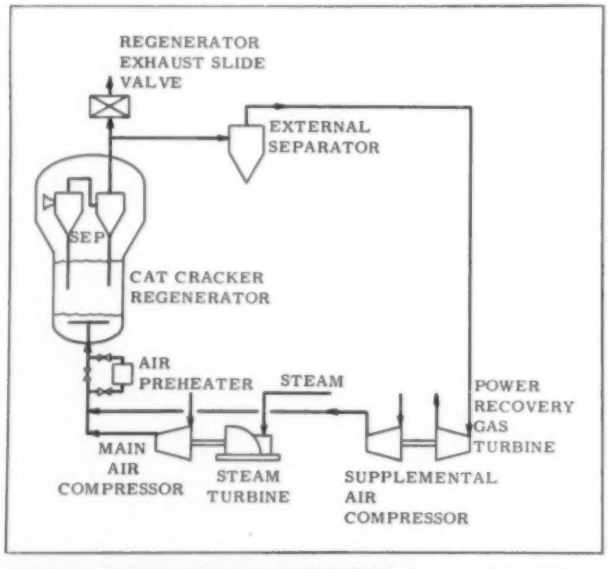
With the successful conclusion of the experimental turbine program at Shell's Montreal refinery, it is now possible to think in terms of a third category for the recovery of waste energy in the regenerator flue-gas stream: direct expansion in turbines.

Energy recovery . . . Excluding the energy recoverable by burning the CO to CO_2, the total enthalpy (C_pT) of the gas as it leaves the regenerator stack is about 470 B.t.u./lb. for a dense bed temperature of 1,150° F. Conventional unfired flue-gas boilers permit recovery as steam of approximately 135 B.t.u./lb. of flue gas; assuming the resulting steam is used to develop mechanical work, about one-seventh of this energy or approximately 20 B.t.u./lb. is usefully recovered. Since the air blower demands about 50 B.t.u./lb. of flue gas, obviously the unfired waste-heat boiler is not capable of self-sustaining the unit.

On the other hand, if the regenerator top pressure is in the range from 18 to 20 psig., then 50 to 60 B.t.u./lb. of flue gas can be usefully recovered by the direct expansion of the stack gases through a turbine. Under these conditions the temperature drop through the turbine is approximately 200° F.; by placing an unfired flue-gas boiler in the exhaust stack of the turbine, it is possible (via steam) to convert to useful mechanical work an additional 15 B.t.u./lb. of flue gas.

The installation of both the expansion turbine and the unfired flue-gas boiler in the exhaust gas stream from the regenerator permits the recovery of about three or four times the useful mechanical work obtainable from the unfired flue gas boiler by itself.

Energy recovery from converting CO to CO_2 is not considered in this comparison since it is possible, if conditions dictate, to include a CO-burning boiler in the system as described later in this paper.

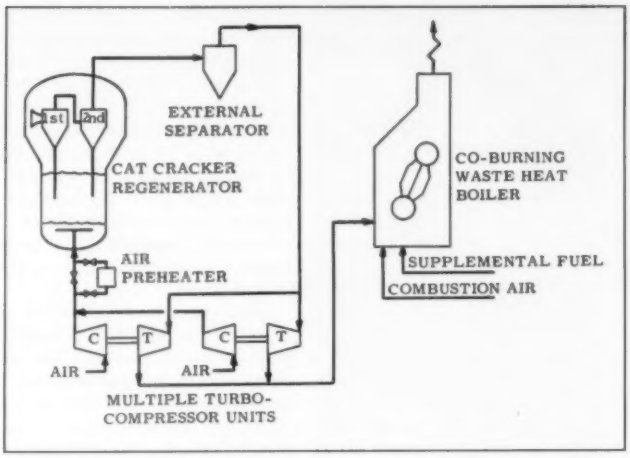


POWER-RECOVERY TURBINE COMPRESSOR for supplemental air to regenerator. Fig. 5.

How it works . . . In the simple open-cycle "gas turbine" a centrifugal or axial-flow compressor inhales atmospheric air, compresses it, and delivers it to a direct-fired heater (combustion chamber). From here the hot gas is expanded through a turbine back to atmosphere. Part of the horsepower developed by the turbine is used to drive the compressor, and the remainder is the useful engine output.

When the gas turbine is integrated with the fluid catalytic cracking unit the regenerator serves as the combustion chamber, and, for the base case, the gas turbine produces no useful power other than that required to drive the compressor, (hp_t, turbine horsepower) = (hp_c, compressor horsepower).

In the well-designed gas turbine engine the ΔP_{c-t}, pressure loss from compressor discharge to turbine inlet, is held to a minimum. However, when the fluid bed of the regenerator serves as the combustion chamber, the magnitude of this ΔP_{c-t} is established by



POWER CIRCUIT utilizing power-recovery turbine compressor and low-pressure CO-burning steam boiler. Fig. 7.

the characteristics of the fluid bed and is considerably greater.

Other portions of the system, such as the piping and regenerator cyclone separators, combine to add to the $\Delta P_{c\text{-}t}$. Because of this increased $\Delta P_{c\text{-}t}$ the turbine "sees" a lower inlet pressure and therefore delivers less horsepower.

The important equations are (using compatible units):

$$hp_t = \frac{G_t(C_p)_t T_t \times [(P_t/P_{out})^{(k-1)/k} - 1] \times \eta_t \eta_m}{[(P_t/P_{out})^{(k-1)/k}]}$$

$$hp_c = [G_c(C_p)_c T_c/\eta_c] \times [(P_c/P_{in})^{(k-1)/k} - 1]$$

$$P_t = P_c - \Delta P_{c-t}$$

where:

G = weight flow rate of gas
C_p = specific heat of gas
T = inlet gas absolute temperature
P = absolute pressure of gas
η = isentropic efficiency
k = specific heat ratio of gas

Subscripts:

c = compressor
t = turbine
m = mechanical

As the $\Delta P_{c\text{-}t}$ increases, the turbine power decreases for a constant compressor discharge pressure, P_c. The limit arrives when the turbine power just equals compressor power which remains constant as the $\Delta P_{c\text{-}t}$ increases. (The information presented in Fig. 6 was developed by choosing various compressor discharge pressures, in effect compressor pressure ratio, and then computing the ratio of hp_t/hp_c for different $\Delta P_{c\text{-}t}$'s.)

Calculations shown in Fig. 6 were made using these values for the terms in the equations:

$T_t = 1{,}100°$ F. turbine inlet temp.
$G_t/G_c = 1.09$ ratio turbine flow rate to comp. flow rate
$\eta_c = 0.77$ compressor efficiency
$\eta_t = 0.79$ turbine efficiency
$\eta_m = 0.98$ mechanical efficiency
$T_c = 100°$ F. comp. inlet temp.
$P_{in} = 14.4$ psia. comp. inlet pressure
$P_{out} = 14.9$ psia. turbine outlet pressure
$Rh = 80\%$ relative humidity
hp_t = turbine horsepower
hp_c = compressor power
$\Delta P_{c\text{-}t}$ = pressure loss from comp. discharge to turbine inlet
ρ_c = comp. pressure ratio

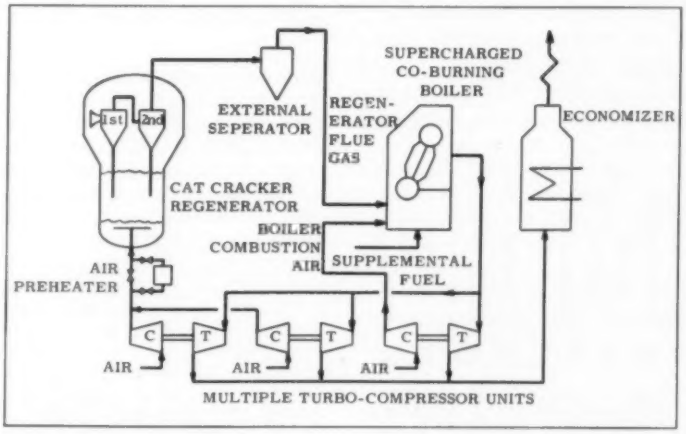
Another point of interest: the simple open-cycle gas turbine is normally controlled by varying the turbine inlet gas temperature, T_t, which is a function of the fuel rate to the combustion chamber. With the regenerator replacing the combustion chamber, T_t is fixed by process operating conditions and thus the primary means of control must be handled in some other way.

Air Augmentation—Existing Units

Existing fluid catalytic cracking units offer the means for immediate application of flue gas power recovery turbines. A portion of the flue gas can be passed through a turbine which drives an air compressor delivering combustion air to the regenerator dense bed. This scheme is shown diagrammatically in Fig. 5.

For those cases where coke-burning capability is a bottleneck to increasing plant yield, the power recovery turbine-compressor offers the lowest capital cost means of augmenting the existing air supply system. Also, compared with conventional prime movers, the operating cost is negligible.

Power-balanced unit . . . As an extension of the case shown in Fig. 5, one may consider reducing the size of the steam turbine and its air compressor while at the same time increasing the size of the power recovery turbine-



POWER HOOKUP utilizing power-recovery turbine and supercharged CO-burning steam boiler. Fig. 8.

"give me ONE good reason"

That's what the man said, "Give me one good reason for buying a Platinum Reforming Catalyst from you. One brand's pretty much like another." And so it would seem on the surface. We could argue with conviction that Houdry 3-G often produces very high octane reformates at a lower cost and that the rate of catalyst deactivation between regenerations is very low. But even if Houdry 3-G were exactly like all others, there is one important reason why Houdry should be your source of supply:

To our people catalysis is a way of life. We not only develop and make catalysts but we understand how they work from engineering to operation. If you want a Platinum Reforming Catalyst with a pedigree as long as your arm, pick up your phone and call us.

* HOUDRY CATALYSTS

HOUDRY PROCESS CORPORATION
1528 Walnut Street, Philadelphia 2, Pa.

*Houdry means Progress . . . through Catalysis

compressor set. In the limit, this shift may be carried out to the point where the steam turbine and its compressor are completely eliminated.

Many current cat cracker designs employ temperature and pressure relationships which permit the recovery of sufficient power from the turbine to provide all of the power required to drive the combustion air compressor. In effect, the catalytic cracking unit can be power balanced.

For normal air-compressor intake conditions, 1,100° F. gas inlet temperature to the turbine, and reasonable turbocompressor efficiencies, Fig. 6 describes the relationship between system pressure loss ($\Delta P_{c\text{-}t}$ from compressor discharge to turbine inlet) and air compressor pressure ratio as a function of turbine - to - compressor power ratio.

For successful power balanced operation the turbine shaft power output must equal or exceed the compressor shaft input horsepower; the horsepower ratio, hp_t/hp_c, is equal to or greater than 1.0. In a practical design the excess turbine power provides the system with control flexibility.

Low-pressure CO boiler . . . Fig. 7 shows an extension to the basic system including a conventional, low-pressure, CO-burning boiler receiving turbine exhaust gas. (The regenerator flue gas contains 5-10 vol. % unburned CO gas.) Where the refinery utility balance calls for more steam capacity, a boiler designed to burn CO may have economic justification.

The somewhat higher turbine back pressure imposed by the pressure loss in the CO boiler reduces the turbine-to-compressor power ratio relative to the sample case of Fig. 6. Compared with the usual cat cracker CO-boiler installation additional supplemental firing is required, since the turbine exhaust temperature is from 150° to 200° F. lower than the regenerator flue-gas temperature.

Supercharged CO boiler . . . Still another, and probably the ultimate system design includes a supercharged CO-burning boiler (Fig. 8). With the boiler situated between the regenerator and the turbine, it becomes possible to operate the entire system at essentially regenerator pressure. The power-recovery turbocompressor is used to supply air both to the regenerator and to the pressurized boiler for combustion purposes.

Substantial capital cost savings appear to be possible by placing the regenerator, special separator, the pressurized CO boiler, and turbocompressor sets all on a common structure. Items such as very large, long runs of expensive high-temperature ductwork are eliminated, not to mention other savings.

The manufacturing-engineering department of Shell Oil Co. has made extensive engineering-feasibility and cost studies of such an arrangement; its conclusion is that current design practice for new regenerator vessels leads to designs which are capable of structurally supporting the pressurized boiler, special separator, and turbocompressors.

The system of Fig. 8 offers an additional degree of freedom in design and control not available in the first two cases (the simple power-balanced unit or the low-pressure CO-boiler unit). Here, the engineer can select within limits the most suitable turbine inlet temperature so as to achieve the necessary power balance.

The upper limit of turbine inlet temperature is set by the CO-boiler design since a low temperature difference across the boiler leads to an oversized economizer. Some operational control flexibility is achieved since a bypass may be arranged from the supercharged boiler combustion chamber directly to the turbine inlet.

Means of control . . . After demonstrating that the erosion problem has been minimized and that a power balance can be achieved between the turbine and the compressor, two problems remain to be solved:

1. Means of control must be established, and
2. Adequate startup procedure must be demonstrated.

For the simple power-balanced case (no CO boiler) the system is designed for a power ratio of from 1.05 to 1.10. The excess power is delivered to the compressor and is dissipated from the system by venting between compressor and regenerator.

Constant mass flow rate of air to the regenerator air distributor is achieved by adjusting this vent. For constant air-flow rate to the regenerator, the regenerator dispersed-phase pressure will vary about ± 0.9 psi. for a turbine inlet-temperature variation of ± 100° F.

Excessive flue-gas temperatures resulting from afterburning in the regenerator are controlled by introducing a water spray upstream from the turbine. The excess flow rate created by the water spray is vented to atmosphere through a valve located between the spray station and the turbine inlet. The correct manipulation of the water spray and turbine vent valve will enable the turbine operating conditions to remain constant during periods of regenerator afterburning.

Type of equipment . . . Before discussing a particular means of startup for the completely power-balanced fluid catalytic cracking unit, it is necessary to select the type of turbocompressor machinery. Current regenerator design conditions require turbine efficiencies of 78-80%, compressor efficiencies of 75-77%, or an equivalent combination to produce a power balance. Component efficiencies in these ranges are not difficult to achieve, particularly if one utilizes high-tip-speed aerodynamic machinery where the compressor is capable of developing a pressure ratio of about 2.8 to 3.3 in a single impeller.

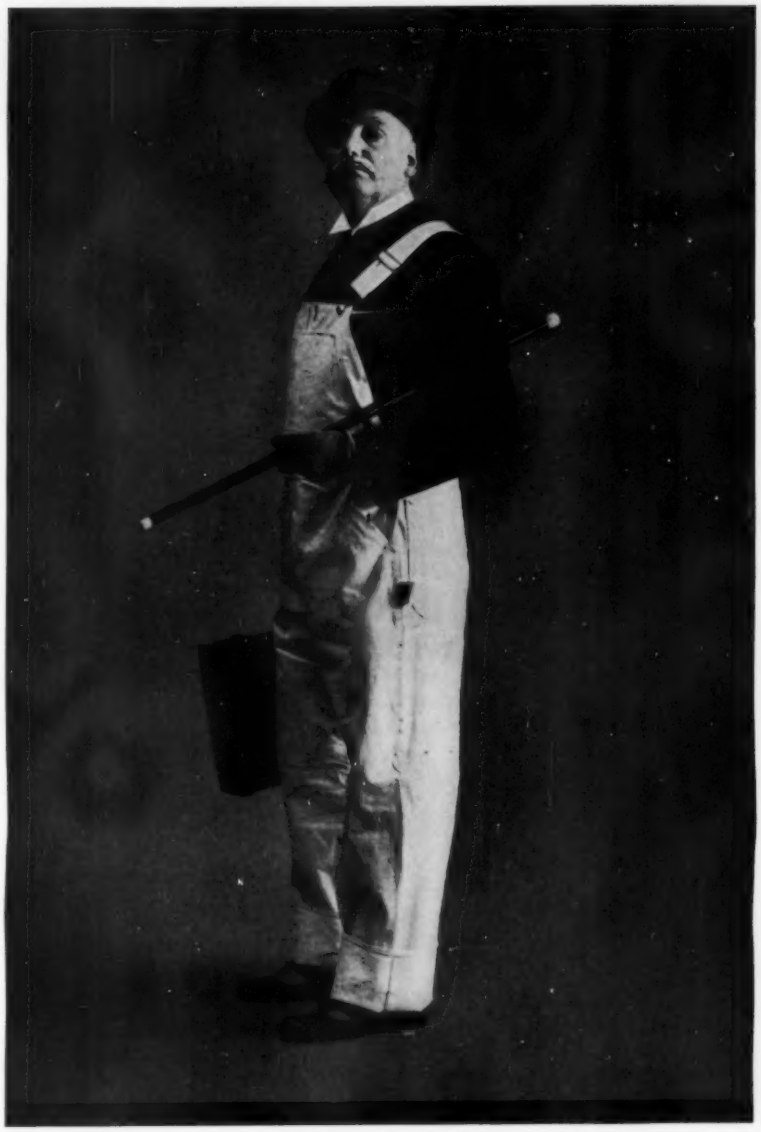
In essentially all respects, turbocompressor machinery is available which can meet the requirements of the power-balanced cat cracker with an adequate regenerator operating pressure. In terms of air capacity they are available in a range of sizes up to about 17,000 s.c.f.m. For those cat crackers requiring greater amounts of air, a number of these units can be installed in parallel (see Figs. 7 and 8).

The experimental program at the Shell Oil East Montreal refinery employed a modified version of one of these turbosupercharger units; Fig. 9 shows a cutaway view. Of course it is possible to use a turbocompressor unit tailored to meet the exact requirements of any given catalytic cracking unit provided the temperatures and pressures of the cycle permit the attainment of a power balance for reasonable component efficiencies.

The scale model, Fig. 10, typical of the parallel-unit installation, shows three power-recovery turbines being served by a single separator. This particular arrangement, capable of delivering 50,000 s.c.f.m. of air to the regenerator, is suitable for either augmenting the air supply to existing plants or functioning as the entire source of air for a power-balanced cat cracker (regenerator coke-burning rate ≈ 20,000 lb./hr).

Means of startup . . . The startup procedure for a cat cracker using multiple turbocompressor units operating in parallel has been carefully studied and now appears relatively straightforward. One of the turbocompressor units may be started up using low-pressure steam in the turbine. During this period there is no catalyst in the regenerator and the system $\Delta P_{c\text{-}t}$ is at a minimum.

The preheater located in the air line at the regenerator inlet is used as a combustion chamber, and the hot gases are returned via the external separator to the next succeeding turbine, and it is brought up to full load. This procedure is repeated until all



DRESSED FOR WORK!

You can put overalls on a man, but can you expect a man's thoughts to "wear working clothes?"

We think so. That's why—once you tell us your requirements for a process such as reforming—you can expect us to show up ready to *work*.

You can also expect new ideas. And with them comes wide experience in catalysts, catalyst research, pilot plants and all grades of charge stocks. This is your assurance of results—top efficiency from the Houdriforming or Iso-Plus Houdriforming process best for producing high octane gasoline or aromatics from your raw materials.

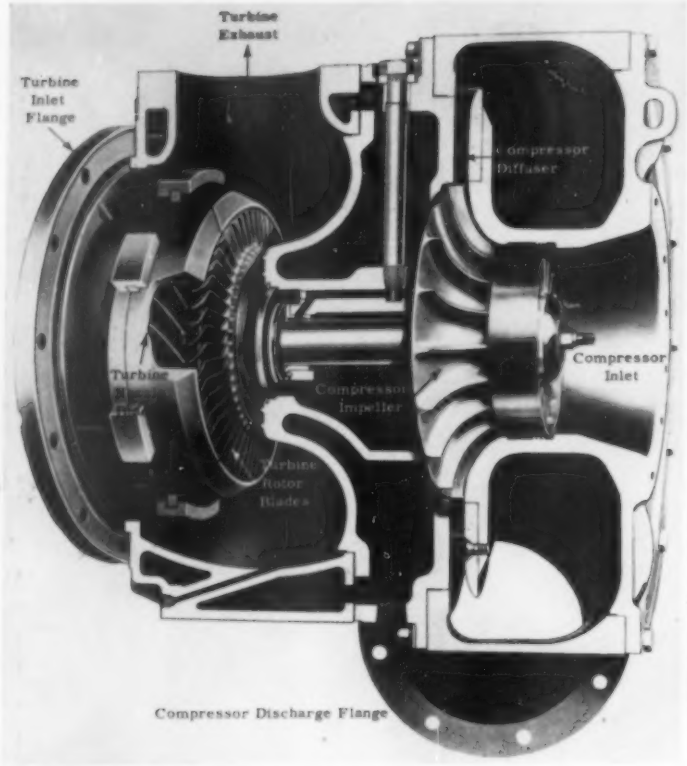
Our "shirtsleeve-kind of service" continues—to help you maintain peak efficiency—*after* the process goes on stream. Mentally and physically, we *stay* dressed for work as long as we're serving you.

*HOUDRY

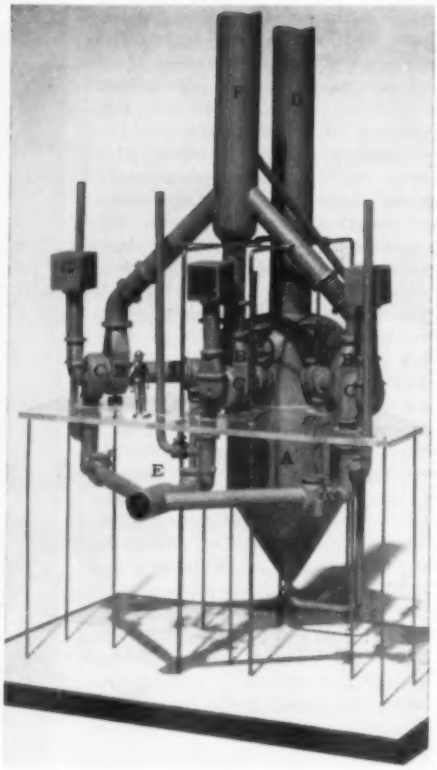
PROCESS CORPORATION

1528 Walnut Street, Philadelphia 2, Penna.

*Houdry means Progress...through Catalysis



CUTAWAY VIEW of turbocompressor. Photograph courtesy Elliott Co. Fig. 9.



THREE power-recovery turbines, each with combined compressor, served by a common separator. Air-flow rate, 50,000 s.c.f.m. A—separator, B—turbine, C—compressor, D—regenerator exhaust flue line, E—air line to regenerator, F—turbine exhaust, and G—compressor air - intake - filter silencer. Fig. 10.

of the turbocompressor units are on stream. In the normal refinery no additional boiler facilities are required for cat cracker startup purposes, since a reasonable amount of low-pressure steam can be made available for a limited period.

After all of the turbocompressor units are self-sustained and catalyst loading to the regenerator has commenced, some steam may have to be readmitted to the turbines to offset the increased system $\Delta P_{c.t}$ before the torch oil is fired.

Units in parallel . . . Parallel operation of aerodynamic compressors and turbines always raises the question, "Is it possible to achieve load sharing among the several machines?" Similarity of performance (speed, pressure, and flow rate) among the several turbocompressor units is achieved by adjustment during factory tests. The performance characteristics of the exhaust-driven turbosuperchargers are extremely well defined, a situation which stems from diesel-engine matching problems.

By design, the turbine nozzle blading can be adjusted to accommodate a rather wide range of turbine flow rates and the diffuser accomplishes the same in the compressor. The overall control scheme will not require individual speed compensation for each unit; by careful calibration at the factory, and by proper ductwork design, the units when presented with the same conditions should run very nearly at the same speed.

Since there was no significant erosion at Montreal, there should be no deterioration in thermodynamic performance; thus, individual turbine performance should not change during the period of operation.

An overspeed protective device can be provided to impose a maximum speed limit for each individual rotating element and also some means can be made available to restrict simultaneously speed of all units before the maximum allowable speed is reached.

Economics

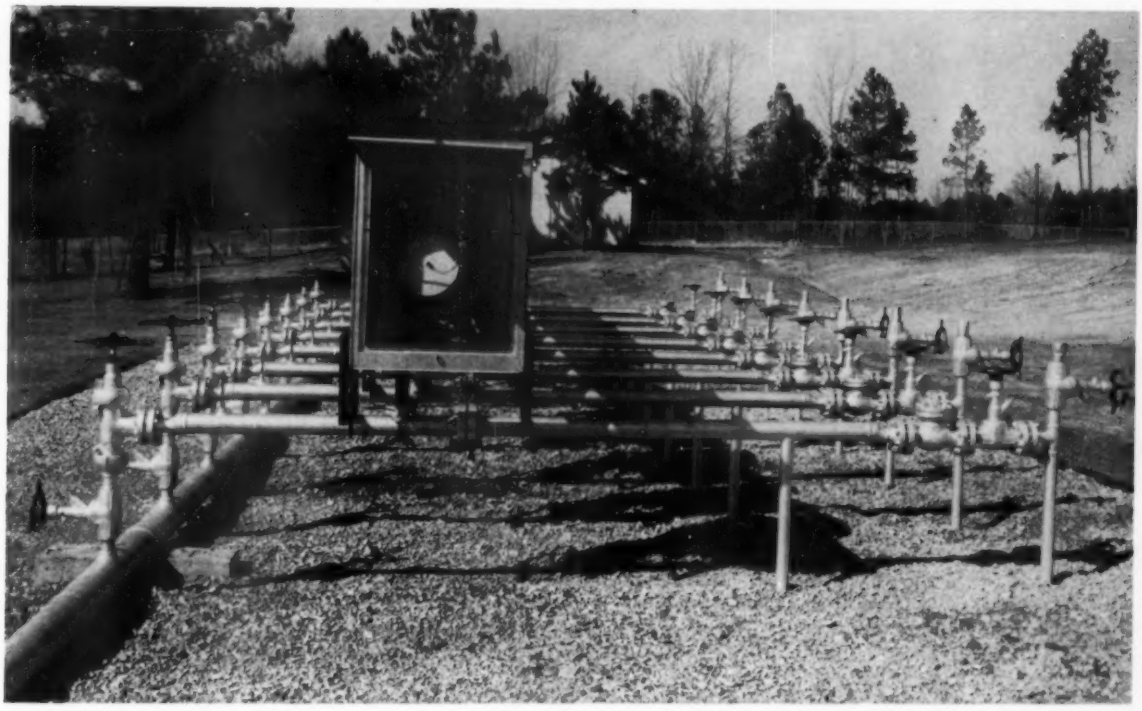
The power-balanced cat cracker offers no product or yield structure improvement. While it may produce more efficient combustion in the regenerator because of higher pressure, the prime incentives stem from capital and operating-cost savings.

For a cat cracker regenerator capable of burning about 35,000 lb./hr. of coke, the installed cost of the external separator and the gas turbocompressor equipment is a standoff with the equivalent steam-turbine-driven compressor and auxiliary equipment of the conventional plant. The installed equipment cost is approximately $1,500,000. However, the steam turbocompressor requires steam and cooling water, and with a condensing turbine these utilities would cost another $1,000,000.

Provided 30,000-40,000 lb./hr. of 50-psig. saturated steam can be made available from other refinery sources during a limited startup period, the gas turbocompressor installation requires no offsite utilities, and the $1,000,000 capital can be claimed as a savings for the gas-turbine case.

On the basis of a condensing turbine capable of driving the air compressor for a plant the size of the one mentioned above, the operating cost might be about 5.4 mil./hp.-hr., and thus for a stream factor of 0.90 the operating cost is approximately $400,000 per year. By eliminating the need for these utilities the gas turbine-cat cracker combination permits a yearly operating cost savings of about one-fourth of the initial capital investment.

SO MANY EXTRA YEARS OF SERVICE WHEN YOU CHOOSE ORBIT VALVES



Orbit Forged Steel ASA Class Valves installed in a gas separation facility located near Gibsland, Louisiana

ASA CLASS OR API CLASS VALVES . . . QUALITY & SAVINGS ARE ALWAYS IN ORBIT!

Dollar savings can be realized by specifying Orbit Forged Steel ASA Class Valves, where possible, in field production piping such as shown in the above photo. Orbit ASA Valves are priced considerably under API rated Orbit Forged Steel Production Valves — which are, of course, competitively priced with other makes of production valves. There are other installations, too, where ASA rated Orbit Valves can be used in production piping — such as meter runs, manifolds, water flooding, gas gathering systems.

Our industrial sales and production sales departments will be glad to make recommendations for the service or services you have in mind — whether your requirements are for ASA or API rated valves.

WRITE FOR CATALOG 58-B COVERING ASA CLASS VALVES OR CATALOG 58-A COVERING PRODUCTION VALVES.

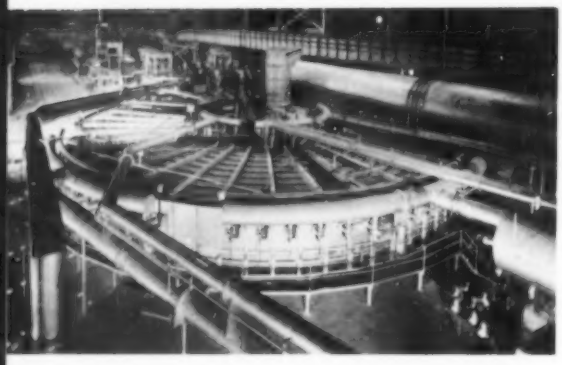
OIL'S FIRST CENTURY
BORN IN FREEDOM
WORKING FOR PROGRESS

ORBIT VALVES

ORBIT VALVE COMPANY

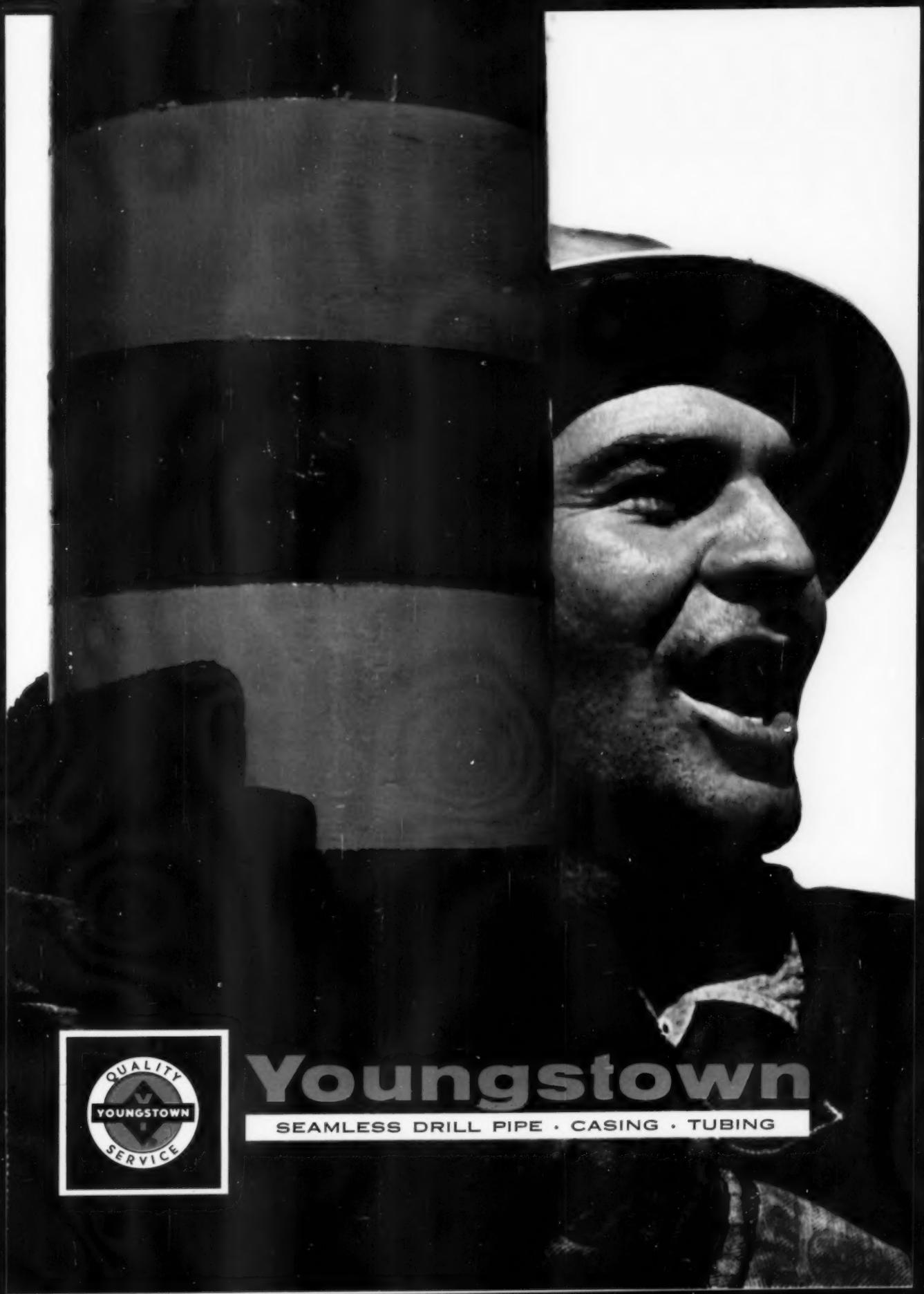
P. O. BOX 699, TULSA, OKLAHOMA, Phone LUther 4-4761, TWX TU 925
WAREHOUSES: HOUSTON, TEXAS, 407 Velasco, CApitol 8-6623, TWX HO 115; ODESSA, TEXAS, 402 West County Road, FEderal 7-2263, TWX ODESSA TEX 8706; LAFAYETTE, LOUISIANA, 3111 Cameron St., CEnter 4-3326; CASPER, WYOMING, 414 South Elm Street, Phone 2-1324; EDMONTON, ALBERTA, CANADA, 7119-104th St., Phone 391-283. WEST COAST REPRESENTATIVES: Charles Lowe Company, 383 Fourth Street, San Francisco, Calif.; Marshall E. Niedecker Company, 2785 Cherry Ave., Signal Hill, Calif. CANADIAN REPRESENTATIVES: T. R. Pickford & Company, Ltd., Calgary, Alberta, 309 7th Avenue West; Amherst 2-7371. EXPORT REPRESENTATIVE: New York 36, N. Y., 500 Fifth Avenue, BRyant 9-2236.

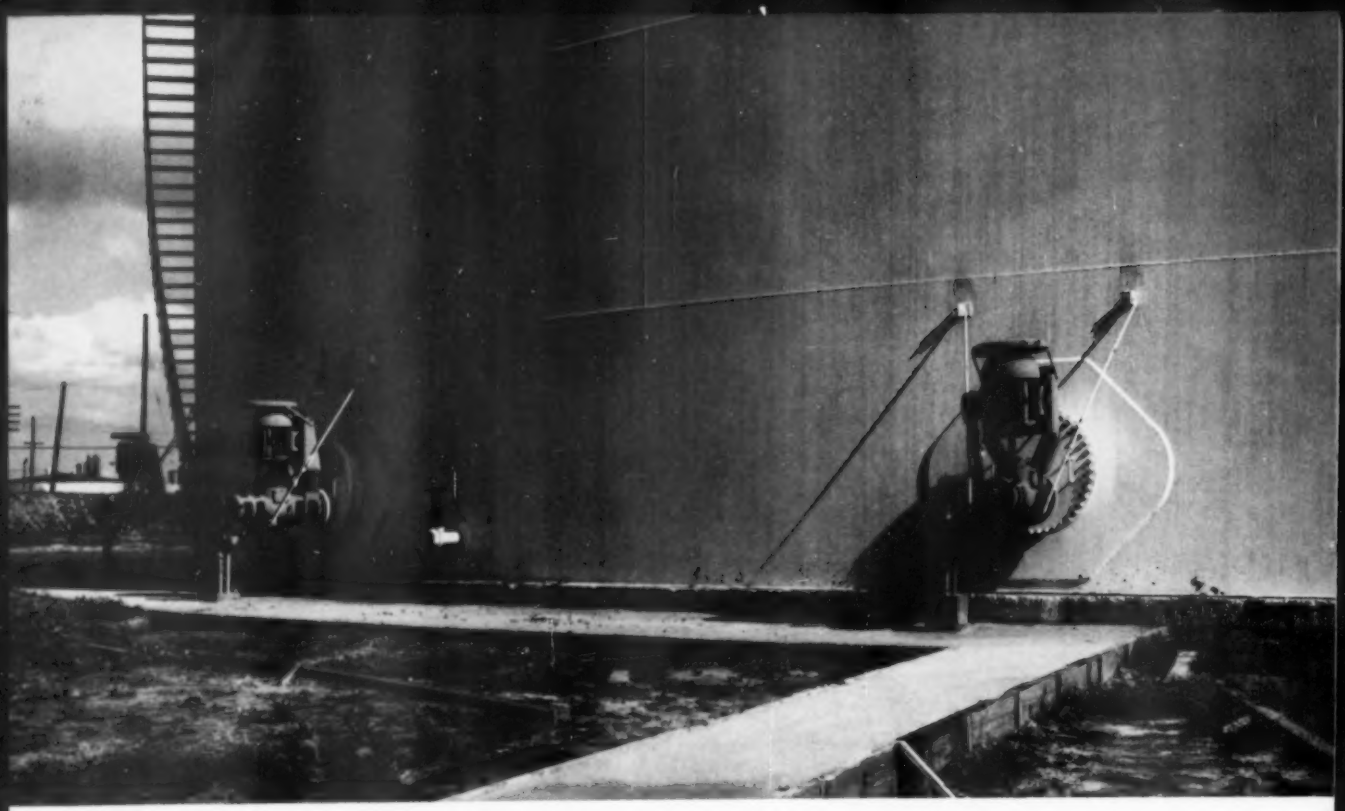
WHEREVER YOU FIND PIPE WITH ORANGE BANDS YOU'LL FIND A SMART PIPE BUYER



Youngstown's fully-automated ultra-modern No. 3 Seamless Mill now operating at our Indiana Harbor Works near Chicago . . . turns out the pipe with orange bands, the finest made anywhere. Illustrated is the world's largest Rotary Hearth Furnace . . . here three billets per minute are heated so that quality seamless pipe can work for you on your next drilling job!

THE YOUNGSTOWN SHEET AND TUBE COMPANY
Youngstown, Ohio


QUALITY
YOUNGSTOWN
SERVICE
Youngstown
SEAMLESS DRILL PIPE · CASING · TUBING



You save $1000 per tank per year

when you keep bottoms clean by pressing a button

Take a minute to add up what it costs you to clean out the sediment in an 80,000-barrel crude storage tank.

The answer—5000 to 8000 dollars—may amaze you. Yet these figures are based on careful field studies by a major pipeline company.

Your total cost includes:

- what you pay for cleaning
- your overhead while the tank is out of service
- value of refinable oil and wax you lose in the bottoms (at least $2000—and sometimes as high as $6000).

Fortunately, this is one expense you don't have to accept. Prevention is easy.

Put LIGHTNIN Mixers on your tanks, and start enjoying savings *on the order of $1000 per 80,000-barrel tank per year.* Savings on larger tanks are equally spectacular.

No need to scrape out sludge

You eliminate sludge buildup—for good—when you install LIGHTNIN Mixers. By pressing a switch button, you start the tank contents in gentle motion that keeps sediment suspended in the crude, or resuspends any that has settled. You can keep bottom sediment level, year to year, as low as *one inch.*

You dispatch a more uniform crude when you use LIGHTNINS in your tanks. Crude leaving the tank has the same values as when it entered the tank. You overcome the risk of large slugs of accumulated sediment breaking loose and moving into the pipeline.

By eliminating downtime for sludge cleanout, you keep your tank farm's *full holding capacity* ready for use when you need it. You gain as much as 12% more storage capacity—without adding a single tank.

Do this today

More than 50 independent pipeline companies and about 35 leading producers and refiners are cutting crude storage costs this effortless LIGHTNIN way. So can you! To see how, just call in your LIGHTNIN Mixer representative (listed in Pipeline Composite Catalog). Or write us direct.

Lightnin® Mixers

MIXCO fluid mixing specialists

LOW OPERATING COST. It takes as little as one hour to suspend sediment in a full tank. Upkeep is simple; choice of stuffing boxes to meet your conditions, or mechanical seals that eliminate stuffing-box maintenance.

Get these helpful bulletins on BS&W control and LIGHTNIN Mixers. Check, tear out and mail to us today with your name and company address. Free—no obligation.

- ☐ BS&W Control with LIGHTNIN Mixers (B-503)
- ☐ Side entering mixers, 1 to 25 HP (B-104)
- ☐ Data sheet for figuring mixer requirements (B-107)
- ☐ Condensed catalog describing LIGHTNIN Mixers—all types (B-109)
- ☐ LIGHTNIN rotary mechanical seals for extra-low-cost mixing (B-111)

MIXING EQUIPMENT Co., Inc 174-d Mt. Read Blvd., Rochester 3, N.Y.

In Canada: Greey Mixing Equipment, Ltd., 100 Miranda Avenue, Toronto 19, Ont.

What you ought to know about gas chromatography

BY A. J. MILLER

Here's a panel discussion from the Oklahoma City regional meeting of Natural Gasoline Association of America.

Moderator:

A. J. Miller, Phillips Petroleum Co.

Panel Members:

J. W. Askins, Tennessee Gas Transmission Co.
Bruce Denny, Sunray Mid-Continent Oil Co.
R. V. Randall, Humble Oil & Refining Co.
C. H. Roskamp, Phillips Petroleum Co.

THE PURPOSE of this section is to give the plant man the opportunity to obtain answers to his questions, in everyday nontechnical language, regarding the practical use of chromatography in gas-processing plants.

The four panelists are experienced in various plant uses of chromatography. As an introduction, it is my job to very briefly cover some background information about chromatography and about the chromatography project that the NGAA analysis subcommittee is conducting.

Chromatography Fundamentals

Basically, gas chromatography is a method of separating a gaseous or volatile mixture into its components. Its principle of separation is the selective attraction of a material, usually contained in a packed column, for the various components to be separated from a mixture. Its outstanding features include its ability to make sharp separations speedily that might require thousands of trays and much longer time or even be impossible to separate by distillation.

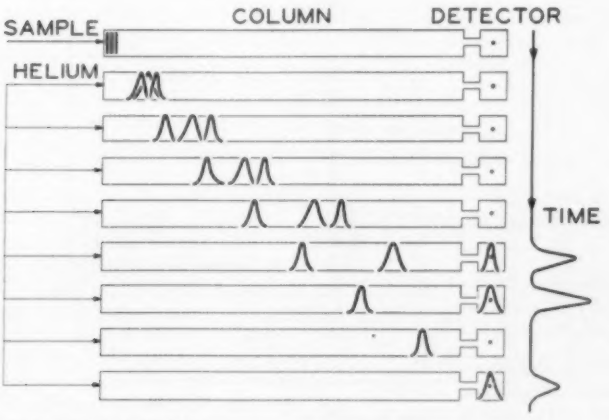
Fig. 1 illustrates the separating action by gas chromatography in a column. Some gases pass through more quickly than others. This is indicated by the various peaks as time goes by.

Fig. 2 shows a simplified schematic diagram of apparatus involved. A carrier gas, usually helium, carries the sample through the column. A detector cell (usually thermal conductivity), is used to determine when the various components come through the packed bed. This is indicated on a strip-chart recorder. Retention time is the time a sample stays in the column. Peak height refers to the height of a pip or peak on the curve. Peak area refers to the area under the peak curve.

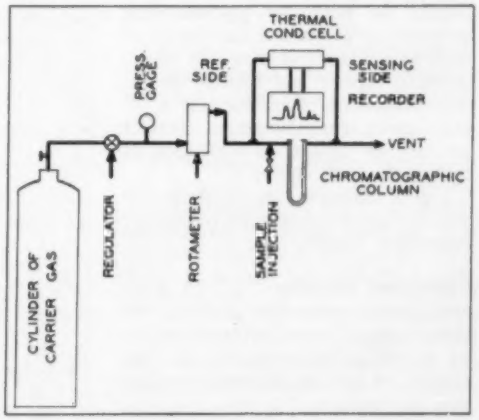
Practical Applications

The concentrations of individual components such as nitrogen, carbon dioxide, oxygen, and almost any of the hydrocarbons in most plant streams can be automatically monitored and recorded. The measurement of a composite stream property such as heating value or specific gravity is often inadequate for industry needs and gas chromatography has opened a new area of possibilities with its ability to automatically separate and look at individual components with sufficient speed for stream monitoring.

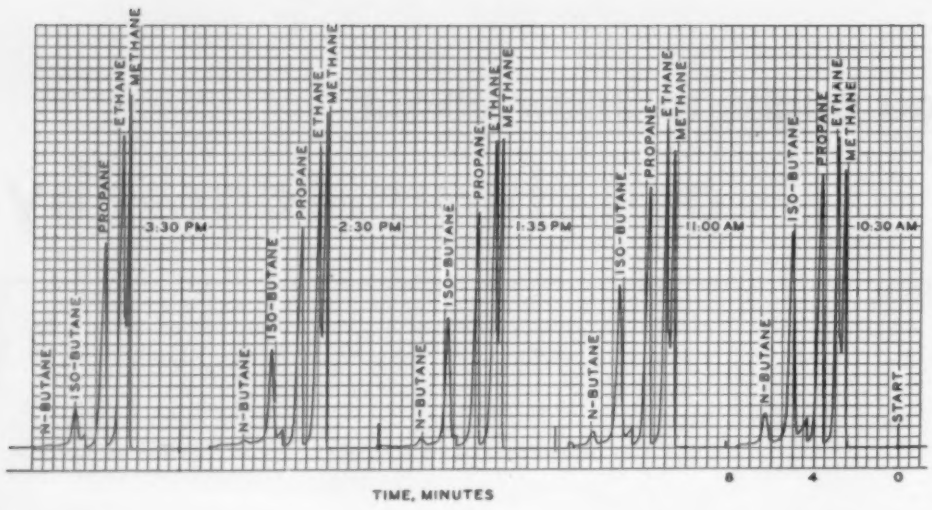
Fig. 3 shows how the relative effects of plant operating changes on the composition of a plant stream may be quickly determined by use of a chromatograph. This case shows how propane and butanes in the overhead stream of a column decreased as excess water was eliminated from the plant system over a period of 5 hours. This brought performance into agreement with design and not only saved



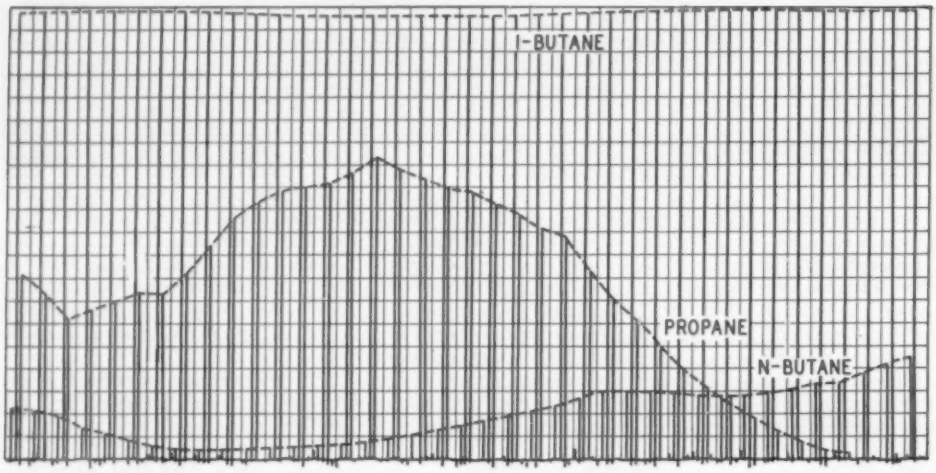
SEPARATING ACTION by gas chromatography in a column. Some gases pass through more quickly than others, as indicated by the various peaks as time goes by. Fig. 1.



SIMPLIFIED SCHEMATIC DIAGRAM of the apparatus involved. A carrier gas, usually helium, carries sample through column. Fig. 2.



HERE'S HOW the relative effects of plant operating changes on the composition of a plant stream may be quickly determined by the use of a chromatograph. Fig. 3.



RESULTS of stream monitor in a bar-graph form. Fig. 4.

product for the plant but reduced other operating troubles.

Fig. 4 shows stream monitor results in bar-graph form.

Absorber checking . . . Percentage absorption figures on key components, usually the basis for gasoline-plant performance guarantees and always of value in efficiency studies, can be determined rapidly and reliably by direct comparison of residue and inlet-gas sample chromatograms. Similar use may be applied to evaluation of column-tray efficiencies.

Fig. 5 illustrates use of chromatograms to quickly determine percentage absorption figures.

Conversion checking . . . In light-hydrocarbon conversion processes, the direct comparison of effluent and inlet sample chromatograms can frequently be used to determine conversion percentages.

Fractionator operation . . . Users of chromatographs for guidance of frac-

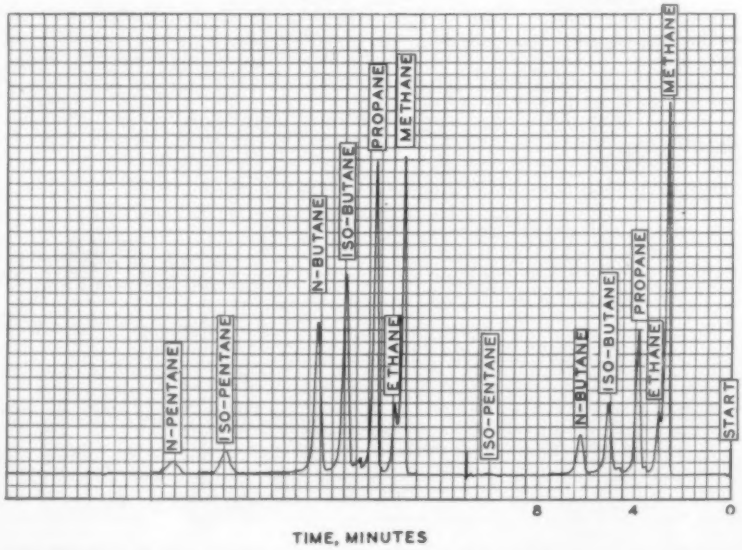


ILLUSTRATION of use of chromagrams to quickly determine percentage absorption figures. Fig. 5.

tionator operation are enthusiastic about the speedy and reliable results that are increasing efficiency and allowing operations to meet specifications on products without waste due to overpurity. Control tests such as vapor pressure, distillation, and weathering tests are being supplanted.

Automatic control . . . The use of on-stream chromatographs for automatic control of process variables has been successfully demonstrated, opening a very promising phase of plant instrumentation.

Product quality studies . . . Separations of many products into close boiling isomers that required much time and several thousand theoretical plates by distillation, or were impossible to separate by distillate, are now being rapidly and routinely separated.

NGAA Program

The analysis subcommittee of the NGAA technical committee has been working for over 10 years to improve light-hydrocarbon analysis in accordance to the growing need for increased speed and accuracy in the natural-gasoline and gas industry.

Among other things, the subcommittee has sponsored a cooperative low - temperature - distillation analysis program in which over 120 industry laboratories have participated. The correlations and conclusions resulting from the figures obtained have uncovered causes of error, some of which were systematic and therefore of particular concern, and provided factual information as to over-all industry status of the analysis at about annual intervals for the last 10 years.

The improvement was progressive and significant with the systematic errors virtually eliminated as shown by correlations on successive samples over the years. No doubt this improvement was due in large measure to willingness of personnel to accept conclusions and recommendations derived from the cooperative factual data. Even so, low-temperature-distillation analysis remained inherently slow and subject to "human element" errors.

First tests . . . The subcommittee first became interested in chromatography in 1954 when results were received in the program that were run on the Fracton, a commercial apparatus that uses a charcoal column for separation and thermal conductivity cell for detection of the components. These results indicated the speed and separating ability of chromatography. This interest stimulated a number of the participating laboratories to investigate chromatography and in the 1956 cooperative program on NGAA Liquid Sample No. 7, 10 laboratories, on an experimental basis, reported results by some form of chromatography.

The subcommittee then sponsored a series of round-table meetings for those members interested in using chromatography. These meetings were for the purpose of information exchange and mutual discussion of experiences and problems. These discussions revealed enthusiastic agreement as to gas chromatography's outstanding features of speed, separating power, reproducibility of results run under the same conditions on the same instrument, reliability of comparative results, trace component detection, etc. This makes it a great tool for many purposes.

Variations . . . However, also evident were problems and major variations in techniques, calibration methods, computation methods, etc., that require evaluation as to effects on results. In order to evaluate these variables and select the most reliable procedures, the NGAA analysis subcommittee is using an approach paralleling the low - temperature - distillation cooperative-analysis program.

Their first objective is to determine a reliable and accurate procedure for the analysis of natural gas by gas chromatography. Thirteen industry laboratories, that are routinely using gas chromatography, participated in cooperative analysis of the first NGAA gas sample in this program. The results showed wide scatter, particularly on the heavy-end isomers. Some of the causes of these variations were indicated, and the second sample analysis is now in progress by 19 industry laboratories.

These and other such cooperative results will reveal the necessary rules for obtaining the desired reproducibility by different laboratories. Synthetic samples of known composition will be used in the program to evaluate accuracy of the methods. The objective is the formulation of industry standard methods for chromatographic analysis of natural gas and natural-gas liquids that will be cooperatively tested and appraised as to reproducibility and accuracy.

Question-answer session

Q: We understand you have an automatic instrument installed in one of your plants. What is its application?

DENNY: We have a chromatographic instrument on the residues of two deethanizing absorbers at our Snyder, Tex., plant. We use manual switching between the two. The instrument is automatic, giving analysis every 15 minutes.

Q: What is the function of the instrument on the residues of the two absorbers?

DENNY: Our specific application of chromatography is to monitor residue streams from the deethanizing absorbers. We try to keep propane concentration very low. We also watch the ethane peak for an indication of propane vapor pressure.

Q: How long does it take to make a chromatographic analysis on a lab unit?

ASKINS: In our laboratory it takes about 25 minutes on the average to analyze one gas sample.

Q: We understand you have an automatic instrument installed in one of your plants. How do you use it?

ROSKAMP: We use an instrument to successfully control the composition of raw kettle product on a deethanizer. The kettle temperature is reset manually, based on results.

Q: How do you introduce a liquid sample from your deethanizer kettle into the plant analyzer?

ROSKAMP: The sample is piped from the liquid sampling point through tubing into a vaporizer regulator. The outlet of the vaporizer is temperature-controlled and then passes through a section of tubing in the analyzer to insure that the vapor enters the sample loop at the instrument-operating temperature.

Q: How does the accuracy of chromatographic analysis compare with low-temperature distillation analysis?

RANDALL: Chromatographic analysis is more accurate than low-temperature distillation. It will ultimately supplant all distillation analyses. It is currently used on most gases and will be used for most liquid analyses within a year.

MILLER: However, not all instrument users are getting good results. Lack of reliable calibration or reference standards is one cause.

Q: Are the results of chromatographic analysis acceptable to both

Congrats and $25 to Billy D. Brown, T.P. Coal & Oil Co., P. O. Box 4067, Midland, Texas

Since the petroleum industry made its lusty entrance with the Drake well a century ago . . some remarkable records of achievement have been chalked up by oil and gas men.

Lone Star Steel represents one of the great forward steps, and a real convenience for Joe Roughneck . . because Lone Star fine API pipe is made and delivered daily in the heart of the oil country.

Lone Star is a round-the-clock quality operation. You can depend upon Lone Star API casing, tubing and line pipe.

Neighbor, wherever you are, specify Lone Star and we both get a good deal.

© 1956 Lone Star Steel Company

Lone Star STEEL COMPANY

EXECUTIVE—SALES OFFICES
W. Mockingbird Lane at Roper • P. O. Box 12226 • Dallas, Texas
DISTRICT SALES OFFICES
912 Republic National Bank Building, Dallas, Texas
Houston, Texas | Midland, Texas | Tulsa, Oklahoma

parties entering into a gas contract?

ASKINS: The results are accepted by both parties in many cases. Otherwise we run a check by low-temperature - distillation analysis. Acceptance of chromatography is gaining.

Q: How much maintenance does your automatic unit require?

DENNY: Our maintenance history is this: We first used the manufacturer's engineer for a period of 1 year. Now, we simply have an electrician for preventive maintenance. Circuit of the instrument is not too complicated. Very little maintenance has been required.

Q: How long does it take to train a man to operate a chromatograph for analysis of natural - gasoline plant streams?

ASKINS: A man can be trained to manipulate and operate the machine on a routine basis in 1 week. By then he can get duplication on routine samples. Of course, it will take much longer for him to be able to recognize and cope with unusual difficulties.

DENNY: We trained 10 men in 6 months for operation of a lab-model instrument. Men who were gagers, tank-farm operators, and the like.

ROSKAMP: Recognizing correct results is of course different from mechanical manipulation. One week's training is not sufficient to recognize erroneous operation and make correct interpretation.

Q: Are a great many adjustments required?

ROSKAMP: The operator can recognize when the instrument is not operating properly. An expert checks it once each week. Less and less attention of this type is required as time goes by.

Q: Can complete gas-plant analyses be determined wholly and completely using chromatography?

RANDALL: Yes.

Q: How do you analyze for liquids at the Snyder plant?

DENNY: We use a lab model for liquids.

Q: If gases contain carbon dioxide or nitrogen, how do you tell what the first peak is?

ASKINS: All components come

out of a column in definite order and exact timing depending on the packing material and operating conditions. For natural-gas analysis, we use an activated-charcoal column and a partition column with hexamethyl phosphamide packing. Methane and nitrogen come off together as the first peak from the partition column, followed by ethane, carbon dioxide, propane, isobutane, n-butane and progressively higher-boiling hydrocarbons in that order. The activated carbon column separates nitrogen and methane.

Q: Have you found any uses for chromatography outside the plant yard?

ROSKAMP: Yes. For example, we use it when we are pulling a vacuum on a field system. We use a charcoal packing to check on air content and where it is coming in. There are many uses out in the field, depending on field conditions.

RANDALL: It can be used to check field separation units, and for the analysis of hydrocarbon streams in secondary-recovery operations.

Q: What can you do about contaminants in the gases?

RANDALL: Each application has its peculiar problems. Hydrogen sulfide, oxygen, and nitrogen are examples of contaminants. Each instrument application must be adapted to the conditions at hand.

ROSKAMP: When checking absorbers, columns, and such, you are usually interested in comparative results. Then contaminants won't bother too much. You can still find optimum point.

RANDALL: We sometimes don't want to believe what the chromatograph tells us. It's hard, for example, to believe that a stream has a purity of 98% when low-temperature-distillation analysis has indicated the purity was 95%.

Q: What is the effect of water in a gas sample?

ASKINS: Water in the gas sample will show up as a separate component, right after the pentanes. With some columns and operating temperatures, it travels very slowly through the column and its accumulation may give trouble, and you may have to change the column packing. Reversal of the carrier gas is a method to "back flush" the moisture and other slow-moving

GEM
OF THE
OIL AND GAS
INDUSTRY

To business, industry, the nation's defense and people in general . . oil and gas are more precious than diamonds.

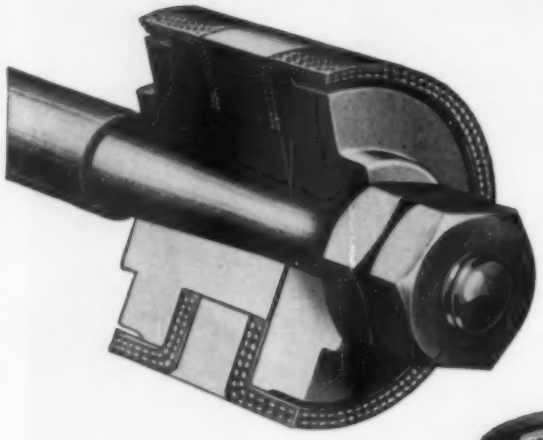
The strong demand for petroleum products means a strong demand for casing, tubing and line pipe . . fine, skillfully crafted pipe as produced by Lone Star Steel. Lone Star pipe is a true quality product . . precision made to high API specifications.

Certainly . . the gem of the oil and gas industry.

Lone Star STEEL
COMPANY

EXECUTIVE—SALES OFFICES
W. Mockingbird Lane at Roper • P. O. Box 12226 • Dallas, Texas
DISTRICT SALES OFFICES
912 Republic National Bank Building, Dallas, Texas
Houston, Texas | Midland, Texas | Tulsa, Oklahoma

LESS FLUID SLIPPAGE!
LESS DOWNTIME!
GREATER EFFICIENCY!



...in hydraulic and pneumatic mechanisms, reciprocating pumps

Darcova Pumcup

Darcova 45° Bevel Type Pumcup

THE BIG DIFFERENCE you'll find in Darcova Pumcups is that they operate at full efficiency *throughout their entire life.* This means fluid slippage is virtually eliminated.

And because fewer replacements are necessary, you have less downtime. Users report that Pumcups *outlast ordinary packings at least 3 to 1!*

Pumcups are available in three textures—hard, medium and soft. Also in regular or 100% nylon composition. Sizes range from ¾" to 20". For all the facts on Pumcups, write for Bulletin 5503.

DARLING VALVE & MANUFACTURING CO.
Williamsport 1, Pa.

DARCOVA
THE ORIGINAL COMPOSITION CUP
TRADE MARK
PUMCUPS

components from the column. Actually water should be removed before the gas enters the column by dehydrite (anhydrous magnesium perchlorate).

Q: How about instrument calibration at Snyder?

DENNY: The regular operator calibrates the instrument once each week. He runs a standard sample and compares it with the previous calibration.

Q: How can you determine helium as a gas sample?

RANDALL: If you want to determine helium in your sample, you must use some carrier other than helium. I suggest argon. By the way, the supply of helium should become more plentiful in the near future.

Q: In preparing hexamethyl phosphamide packing some labs dilute the amide with ether to assure thorough distribution of the reagent on the brick particles. Is this necessary?

ASKINS: We use hexamethyl phosphamide and our procedure is to weigh out 30 grams of agent per 100 grams of brick. Pour agent over the brick. Apply heat to neighborhood of 220° F. to decrease viscosity of agent. Stir. Agent adsorbs on brick. Put packing into the column, using funnel. We use nylon tubing for the column, to enable us to observe the condition of the bed at all times. Condition the bed for 48 hours by running helium through it. Then run a sample and keep running it until you get successive results which duplicate each other. Also, if you have been running lean samples and switch to heavy ones, run the first sample until successive results duplicate themselves.

MILLER: Our research department has found that simply shaking the weighed quantities of brick and agent together in a stoppered bottle produces just as good a packing as the ether dilution method.

Q: What length column is necessary for carbon dioxide resolution?

ASKINS: We have found that a 48-ft. column is necessary.

Q: What's a good drying agent to remove water from a sample?

ASKINS: We use dehydride when we find it necessary to remove water.

ROSKAMP: We use calcium hydride.

Gas chromatography is paying off

at TGP's La Porte fractionating plant by . . .

- Allowing prediction of reflux to towers and temperature changes needed.
- Saving time and money previously spent for commercial analysis.
- Reducing shutdowns and fluctuation of feed streams.
- Enabling economical daily checking of inlet and slop streams.
- Finding leaky valves that are destroying product quality.

BY JOHN W. ASKINS
Tennessee Gas Pipeline Co.

THERE ARE MANY advantages to gas chromatography. One of the important ones is that there is no overlapping or holdup as in distillation. While distillation columns seldom have over a few hundred plates, the chromatographic column may have the equivalent of many thousand. It is more versatile. For example, it will allow a separation of benzene and cyclohexane which have very close boiling points (80.1° and 80.8° C.). It is much more rapid—a matter of minutes rather than hours. Any type of sample can be run in a maximum of 1 hour.

Application of this type of equipment in a products - manufacturing plant can best be shown by a brief discussion of its use in the Tennessee Gas La Porte fractionating plant. Production of this plant is 11,000 bbl. per day equally divided into propane, isobutane, n-butane, and 12-lb. gasoline. The products of the plant are stored in an underground reservoir until sold.

A chromatographic unit was purchased for this location 6 months ago. Previously no type of analysis equipment had been available and the testing apparatus included only the standard vapor-pressure baths and controllers for testing the overhead streams, storage streams, and feed streams.

Vapor pressure is of course a widely accepted control test, but a product which has the correct vapor pressure may still not meet other specifications because of the cracked components of the stream. An analysis can show whether the sample does or does not meet specifications.

Efficiency increased . . . Frequent analyses now help the personnel operate a much more efficient plant. Overhead towers are checked and if the plant is lost, all towers are shut in until, by analysis, the streams meet specifications. Regular analysis allow an operator to predict what the reflux to the towers should be and any adjustment of temperature that may be needed.

Inlet streams to the plant include plant slop streams, isobutane of 88% or more, and 30-lb. gasoline. These are now analyzed each day at the plant with the exception of the gasoline which is checked by a commercial laboratory.

The instrument has helped to find leaky valves by an analysis of the outgoing stream and the stream when it reaches storage. Corrective measures were taken and resulted in a saving of time and money. Similar results have been obtained by cutting down on rerun products of tanks and storage. If the specification of a product is low it can be brought up by mixing with a tank that is high.

From these brief examples it is easy to see the advantages of frequent plant analyses. Before the purchase of the chromatographic unit, the plant had had as many as 8 to 10 samples analyzed per month by a commercial laboratory at $35 per sample. The cost of analysis for 1 year previously was $1,750 and for 6 months afterward $280. Of course, as can be imagined, the speed of getting accurate results is more important than the savings in cost of analysis.

To date, this plant has had little or no rerun stock because of tower upsets, plant shutdowns, or fluctuation of the feed stream. All of the above problems have been answered by the gas-chromatography equipment plus a careful maintenance program of checking any possible leaky valves, lines, manifolds, or storage reservoirs.

Column design . . . The chromatographic column consists of 50 ft. of ¼-in. aluminum tubing packed with 150 g. of 30-50-mesh fire brick coated with 50 g. diethyl malanate and 100 g. 2-5-hexanedione. This packing will separate methane, ethane, ethene, carbon dioxide, propane, propene, isobutane, n-butane, 1-butene, 2-butene cis and trans, and pentanes. No components heavier than these are injected into the column because of the length of time it would take for the separations.

Eventually a back - flushing valve will be installed and then the heavy streams may be analyzed for the light ends and then reversed and the hexanes and heavier will come out of the column as one group and be reported as such. However, it is now quite serviceable and will, for example, separate propane in 7 minutes from the start of a test.

There are many types of equipment using the chromatographic principle. In each type there are many variables which the analyst can change to best suit his needs. For example, a very good column packing to use for natural gas is hexamethyl phosphoramide in a 30 to 40-ft. column. This column will separate methane and inerts (N_2, etc.) and ethane, carbon dioxide, propane, isobutane, n-butane, isopentane, and n-pentane, and by back flushing the C_6 plus may be determined and reported.

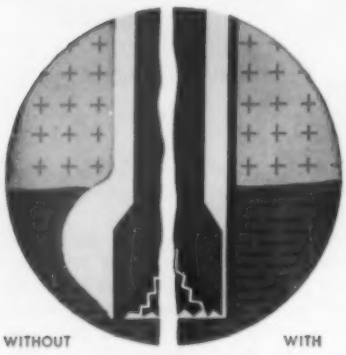
A 4-ft. charcoal column can be used for nitrogen separation if it is desired.

Paper presented at NGAA regional meeting, Corpus Christi, Tex.

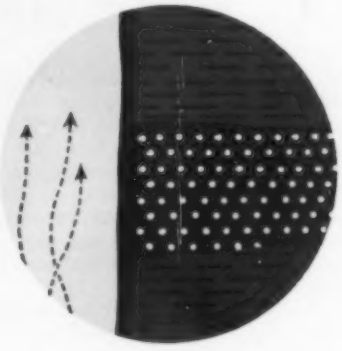
Seeing is believing . . .

IMPERMEX*

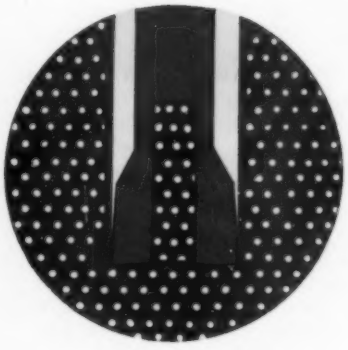
controls *mud filtration properties*



LESS HOLE TROUBLE



PROTECTS PRODUCTIVE ZONES



BETTER CORES AND DST'S

Write for complete technical data bulletin on use of IMPERMEX.

IMPERMEX . . . successfully used for years to control mud filtrate loss.

IMPERMEX . . . controls mud filtrate loss in the presence of all drilled and make-up water contaminants.

IMPERMEX . . . allows better coring and easier drill stem testing.

BAROID

BAROID DIVISION NATIONAL LEAD COMPANY

MAIN OFFICE: P. O. BOX 1675, HOUSTON 1, TEXAS

* Registered Trademark, Baroid Division National Lead Co.

VISIT BAROID BOOTH AT TULSA! MAY 14-23, OKLAHOMA BUILDING—BAROID BOOTHS 83-84, 127-128

6906

Atlantic reduces inventory 20% by putting the

Accent on parts interchangeability

Handling is streamlined and flexibility is improved

BY LARRY RESEN
Refining Editor

AN EXTENSIVE reorganization of the stores system is under way at Atlantic Refining Co.'s Philadelphia refinery which includes a heavy emphasis on parts interchangeability.

Object of the realignment is a reduction in inventories, an elimination of duplication in ordering and storing parts, minimization of obsolescence, and positive inventory control to insure an adequate supply of parts as and when needed.

An immediate economic gain is anticipated in a 20% reduction in inventory. On a continuing basis savings each year after implementation are projected at the rate of 10% of base inventory investment. Introduction of the program which leans heavily on punched-card and computer techniques will cost about 10% of the inventory investment. Maintenance and administration of the system is estimated to cost about 2% of the inventory per year.

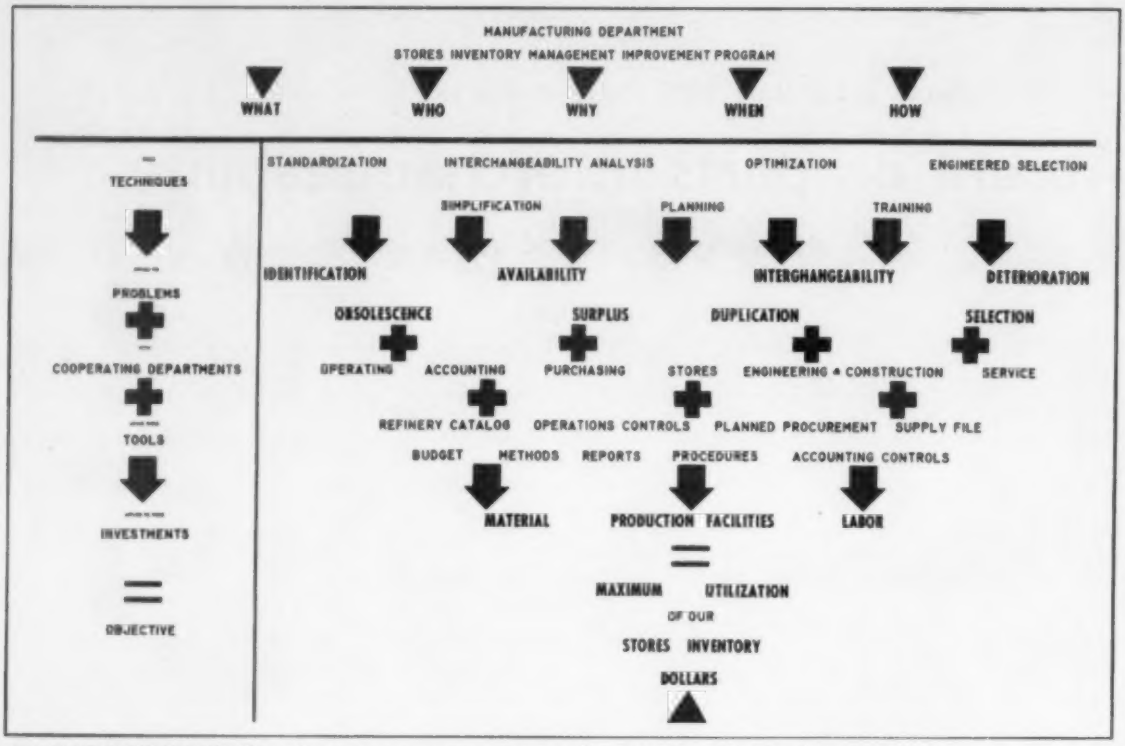
Preplanning was an important factor in Atlantic's decision to adopt the new program. Potential improvements to be anticipated, the steps required to implement the improvements, and the anticipated savings on a percentage basis are shown in Fig. 1. A graphical portrayal of these are given in Fig. 2.

As part of Atlantic's program, IBM cards are used on all transaction activity in stores operations. This card contains a description of an item along with a specific code or numerical symbol. As each phase of spare parts interchangeability, duplication, and application analysis is completed, the

MANUFACTURING DEPARTMENT — STORES INVENTORY MANAGEMENT IMPROVEMENT PROGRAM JUSTIFICATION — COST AND SAVINGS ANALYSIS

POTENTIAL IMPROVEMENTS		ESTIMATED % IMPROVEMENT	REQUIRED STEPS*
* P-1. Development of Standardized Descriptive Nomenclature (Approved Name).			P-2. Development of Coding Systems. P-3. Assignment of Codes.
1. MINIMIZE DUPLICATION	Permits stocking smaller quantity of same item.	5%	1. Duplication Analysis
2. PROMOTE INTERCHANGEABILITY	Permits stocking fewer items.	2-1/2%	2. Interchangeability Analysis
3. IMPROVE SELECTION THROUGH APPLICATION AND STANDARDIZATION	Points up: Paying premium prices for unnecessary quality. or Points up: Increasing quality to increase life and reduce maintenance.	1% 1%	3. Application Analysis
4. REDUCE DETERIORATION	Minimize loss by spoilage or cost of rehabilitation.	1/4%	4. Develop Inventory Protection Methods - Storage - Handling
5. MINIMIZE OBSOLESCENCE	Reduce loss by anticipating change in material requirements.	1/2%	5. Obsolescence - Forecast and Adjustment - Quarterly.
6. MINIMIZE SURPLUSES	Reduce investment in non-working inventory.	1/2%	6. Inventory Movement - Analysis and Adjustment - Quarterly
7. IMPROVE CONTROL OF INVENTORY ADDITIONS	Eliminate needless additions to inventory.	5%	7. Stocking Justification Review.
8. IMPROVE CONTROL OF MATERIAL SPECIFICATIONS	Eliminate errors in procurement or fabrication.	5%	8. Drawing. Specification and Pattern Coordination.
9. IMPROVE AVAILABILITY OF INVENTORY ITEMS	Minimize shortages - emergency premium procurement	10%	9. Inventory Movement - Analysis and Adjustment - Quarterly.
10. OPTIMIZE PROCUREMENT OPERATIONS	Cost, availability, service, quality.	10%	10. Develop Procurement Source File.
11. OPTIMIZE INVENTORY INVESTMENT, SPACE AND HANDLING COST	Promote vendor inventory	5%	11. Vendor Negotiations
			12. Develop Procedures
General			13. Organize 14. Train Personnel
	Initial	20%	
	Yearly	10%	

PUNCH CARD AND COMPUTER TECHNIQUES will enable Atlantic to reorganize stores system and reduce inventory 20% Fig. 1.



NEW INVENTORY PROGRAM works to save company money as shown in this schematic diagram. Fig. 2.

descriptions are being revised. The new cards have the items identified by the manufacturer's description (Fig. 3).

A new code is being assigned to the spare part and once the program is completed, this will be the new designation. The code system consists of nine digits for general application:

xx The first two positions are used to establish a grouping of all materials that are similar. This is recognized as a general commodity class.

xxx Each commodity class contains 1,000 subdivisions. The first subdivision of three digits is used to bring together materials of like nature, shape, composition, manufacturer, source, etc. In this instance, the first subdivision of three digits is used to bring together spare parts for a particular manufacturer.

xxxx Each second subdivision contains 10,000 subdivisions to identify, in this instance, spare parts as to dimension, type, size, specification, or any other differentiating characteristics.

Example:

Commodity Class 79	This commodity grouping is "PUMP REPAIR PARTS, CENTRIFUGAL"
First Subclass B25	XYZ Co. Centrifugal Pumps (Manufacturer Source)
Second Subclass 7400	SHAFT, 4140 STL. PT. 2, STOCK NO. 3a-2043 FOR 1½ ES-B, PUMP, CENTRIFUGAL, SERIAL NO. 63958 (Specific Part)

Application of a flexible numerical code is essential in making effective use of electronic computing and tabulating facilities. Determination of interchangeability, check for duplication, and search for possible substitutions can be made only if each item of inventory is identified by a descriptive numerical code.

Interchangeability-duplication . . . Many cases of duplication in existing spare parts inventory can be attributed to a difference in nomenclature, two or more plant sources requesting a stocking of the item at different times, and use of the item on different equipment in the plant. Fig. 4.

Meanwhile, due to lack of knowledge of interchangeability, parts already in stock are sometimes ignored and others ordered on an emergency basis. Investigation, for instance, showed that a gland for Pump No. 1 and 2 could also be used on Pump No. 3 and other pumps of the same manufacturer. Fig. 5. The present program is due to turn up more and more of these examples, which will simplify the stock situation.

Interchangeability and duplication analyses by Atlantic included every item of plant equipment for which spare parts were stocked. This involved collecting basic information for some 14,000 spare parts for about 3,800 pumps, compressors, turbines, fans, blowers, etc. Collection of the basic information was facilitated by use of a form developed for this purpose. Fig. 6. Machinery history files were used as a reference for details on each item of equipment. The records were then sorted into the various commodity classes already described. They were further subdivided by manufacturer and a predetermined manufacturer's code number applied to each item. These items were further subdivided by size, in ascending order, and type, alphabetically, and a second subdivision number applied. Fig. 7.

Manufacturer's assistance . . . To assist the manufacturers who cooperated greatly in the program, the Spare Parts Interchangeability Data Sheet was developed. Fig. 8. This tally sheet lists the particular manufacturer's spare parts carried in inventory. These parts are listed in the vertical column, the manufacturer's equipment is listed horizontally across the top.

Equipment was identified by size, type, and manufacturer's serial num-

5-738-500

SHAFT

PT. 2 SHAFT FOR SIZE 1-1/2 ES-B
XYZ Cent. Pump Serial 63958

I.B.M. 517167 180

STORE MATERIAL					
DATE	QUANTITY	UNITS	VENDOR	QUANTITY	UNITS
	UNIT PRICE		PD.	UNIT PRICE	
	DOLLARS	CENTS		DOLLARS	CENTS
	ACCOUNT				

Loc.		79-825-7400			
CW	X	SHAFT, 4140 STL, PT. 2, STOCK NO. 4A-2043 FOR 1-1/2 ES-B, SERIAL NO. 63958			Date
3F					
NY		79-825-7440			Account Code
SY					Proxy No.
RD					Vendor
ES		580226			Order No.
rel		Mfgr's. Service Part No. 3A-2043	Atl. Mat. Std. No. -	ARCO Stores Spec. No. -	Req'n. No.
CS		Unit of Purchase Ea.	Std. Pkg. -	Unit of Issue Ea.	Quantity

IBM CARDS are used on all transaction activity. Items are identified by manufacturers' descriptions. Fig. 3.

5-738-500
SHAFT
PT. 2 SHAFT FOR SIZE
1-1/2 ES-B XYZ CENT. PMP.
SERIAL 63958

5-738-501
SHAFT
PT. 2 SHAFT FOR 3" ES-A
XYZ PUMP SER. 65140

INVENTORY DUPLICATIONS can usually be attributed to a difference in nomenclature. These are identical shafts. Fig. 4.

ber. In the past, identification of parts has been based on part name, part number, and serial number of the equipment for which it had been purchased. This was inadequate for determining interchangeability. All impellers, for instance, are not alike. Every pump part is numbered, but in most cases the same part number is used for parts of dissimilar size and material.

There is a primary designating number, however, that can be used. This is usually the number of the manufacturer's detail drawing for the specific part. It is sometimes called stock number, catalog number, piece number, interchangeability number, service part number, etc. In most instances, the material involved with such a number must be specified separately. For this reason, the first column is used for the insertion of the number, and when necessary, the material.

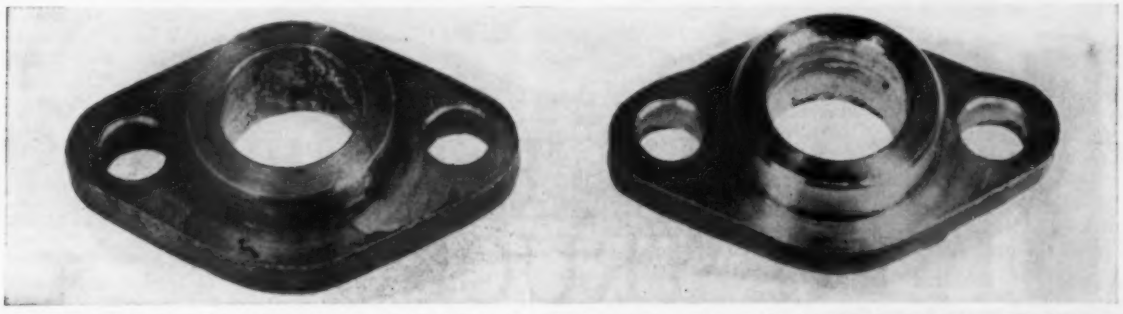
Primary Designating Number

The sheets were assembled according to the manufacturer's preference and submitted to them. The manufacturer inserted the interchangeability number in the first vertical column and indicated in the appropriate vertical columns to the right the specific equipment on which the part could be used.

Since the inventory is already on an electronic computer, it was a simple matter to include this number on each IBM card. After sorting by number, the extent of duplication was visually determined. The parts cards were arranged in alphabetical order and new code numbers applied. These were also included in the data sheets.

Interchangeability was determined by reading across the horizontal columns for each part. The equipment and spare parts record was completed by listing the parts checked in the vertical column below each equipment item. Fig. 6.

Complications . . . The above approach worked well with most manufacturers. In some cases, however, many use



PUMP GLANDS are often identical. Gland at left, for installed pumps, was found to be same as gland at right for new pumps. Fig. 5.

NEW INTERNAT

New look! New custom interiors!

Ready to step out and step over any terrain, this new INTERNATIONAL all-wheel drive pickup combines ruggedness with ability! Choose from two body types—extra-wide, extra-capacity "Bonus-Load" or standard (as shown). They are all-steel from husky sides and ribbed floor to sturdy, sand-tight tailgate . . . are the toughest bodies in the business. Take your power from a truck "six" or new V-8 for more drive with more economy hard-way or highway!

International Harvester Company, Chicago
Motor Trucks • Crawler Tractors
Construction Equipment • McCormick® Farm Equipment and Farmall® Tractors

INTERNATIONAL® TRUCKS

WORLD'S MOST COMPLETE LINE

IONAL® TRUCKS

New loadspace! New truck-designed power!

You name it—they do it! NEW INTERNATIONAL models up to 33,000 lbs. GVW are ready to handle any assignment . . . the tougher the better. They're powered by truck-specialized "six" or V-8 engines. They're distinctively and durably styled with dual headlights and the largest one-piece anodized aluminum grille on any truck. They're the newest additions to the world's most complete truck line . . . at your INTERNATIONAL Dealer's now!

Choose from 5 economy-proved INTERNATIONAL "SIXES"

Choice of 220, 240, 264, 282 and 308 cu. in. displacements

All-time, any-time favorites for efficient power at low cost . . . now better than ever! They're short-stroke, low rpm. engines designed for truck loads, truck speeds, truck work exclusively. Latest improvements through research extend engine life and reduce maintenance. Available in a range of horsepower to suit your needs exactly.

Optional . . . 3 new value-proved INTERNATIONAL V-8's

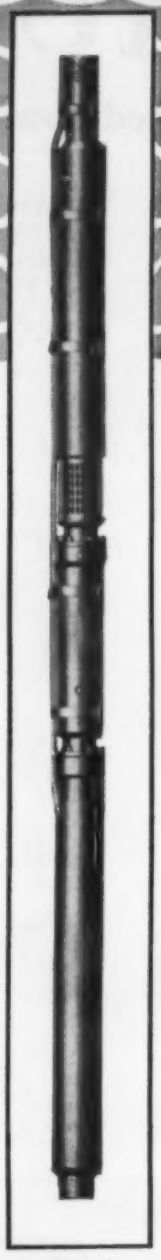
Real money savers that bring brand new economy to V-8 operation! They deliver astonishing mileage from regular gas . . . smooth, lively power with next-to-no oil consumption. Proved by tests. Proved on actual truck jobs. Optional in new INTERNATIONAL pickups to six-wheelers.

New head and "spread" room for 8 . . . 147 cu. ft. of loadspace, more than *any* "wagon". . . in the new INTERNATIONAL Travelall®! Driver's seat is 5 ft. across. Curbside third door adds easy entry and exit. Full 66⅜-in. wide by 50¼-in. high interior takes working loads up to a ton!

New pickup with a back seat! The new INTERNATIONAL Travelette® takes a 6-man crew to the job-site in all-weather comfort . . . and has an all-steel box that hauls standard pickup loads! Choose extra-wide, extra-capacity custom body or standard (as shown). Curbside third door eases entry, exit!

Choose . . . REDA

PUMPS FOR HIGH WATER-OIL RATIO WELLS



High capacity Reda Pumps produce fluid volumes up to 18,000 barrels per day from standard size casings. You can profitably produce wells with a high water-oil ratio. Investment cost per barrel of daily capacity is far lower when you choose REDA for high water-oil ratio wells.

INCREASE YOUR *PROFITS* WITH REDA SUBMERGIBLE ELECTRIC PUMP ADVANTAGES:

- Lower cost for installation, operation and maintenance
- 250 to 18,000 BPD capacities
- Depths to 10,000 Feet
- Corrosion-resistant construction
- Long life — dependable service
- Flexibility to meet changing requirements

Write or call for more information. Reda engineers will be pleased to assist and help plan your operations.

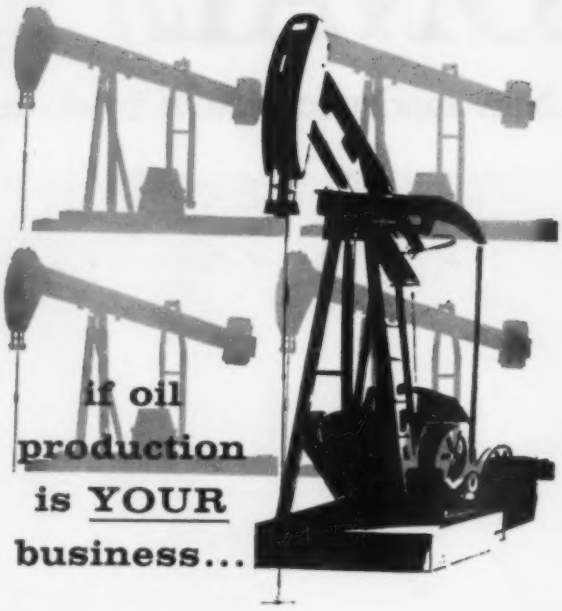
SIGN OF QUALITY SUBMERGIBLE REDA PUMPS

See us at the Oil Show—Kansas Bldg.—Booths 50, 51, 54, 55

REDA PUMP COMPANY

BARTLESVILLE, OKLAHOMA

Manufacturers of submergible motors and pumps for over 35 years — for oil, brine and water wells, gasoline and jet fuel —



if oil production is YOUR business...

helping you is OUR business

Here, at Republic National Bank, the combined experience and proved performance of the South's largest and most active Oil Department are concentrated on better service to the oil producer. However complex your production financing problem, you'll get expert attention to your requirements at Republic. How may we help you?

ADDED STRENGTH YOU CAN BANK ON

CAPITAL AND SURPLUS $100,000,000

LARGEST IN THE SOUTH

REPUBLIC National BANK of Dallas

MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

STORES SECTION PLANT EQUIPMENT AND SPARE PARTS RECORD

TYPE EQUIP.	CLASS	MANUFACTURER	ARCo PROPERTY NO.		STORES CODE
PUMP	CENTRIFUGAL	XYZ	5686		75-825-5240
			LOCATION	SERVICE	DATE
SIZE	TYPE	SERIAL NO.	209 Pipe Still	Crude Naphtha	5-16-58
4"	CTC-B	60786			

INVENTORY SPARE PARTS

PART NAME	MAT'L.	MANUFACTURER'S PART NO.	MANUFACTURER'S SERVICE PART NO.	ARCo DWG. NO.	OLD STORES CODE	NEW STORES CODE	STOREROOM
Ball Bearing Cover-Radial	C.I.	35	3G-3474-3		5-733-002	79-825-2516	
Ball Bearing Cover-Thrust	C.I.	35A	3G-3474-4		5-733-003	79-825-2532	
Gasket - Shaft Sleeve	Al.	17	3A-4885		5-733-730	79-825-3876	
Gasket - Bearing	Seigel-ite 711	17D	3A-2802		5-733-740	79-825-3800	
Impeller 11-3/16" Dia.	C.I.	3	RG 997-1		5-734-450	79-825-4616	

EQUIPMENT AND SPARE PARTS RECORD now shows parts interchangeability clearly. Fig. 6.

components made elsewhere. These include such parts as bearings, seals, packing, gaskets, and fasteners. They have wide application and are in general stock categories, and hence had not been listed in the interchangeability data sheets prior to processing. Consequently, the manufacturer was requested to provide a parts list for each equipment item. Items in the general stock category were extracted from these and added to the data sheets.

A Problem Is Solved

Another problem arose when there were large numbers of equipment items and related repair parts in the plant from a particular manufacturer. In these cases, data sheets 50-900 columns wide consisted of a great number of pages or several volumes. This involved the handling of too many cumbersome sheets. Practical limits of 50 columns in width and 400 spare parts in length were set for these sheets.

With the method here described, Atlantic's stores handling is expected to become increasingly efficient and economical. Enough flexibility has been built into the over-all program to take care of any contingencies in the years ahead. Use of the computer data processing provides timely data for effective inventory management to insure that stocks are maintained in balance on a continuous basis.

Acknowledgment . . . Cooperation of the management of Atlantic Refining Co. in the release of this information and the assistance of H. D. Hansen, M. E. Moughan, and H. M. Beneke are gratefully acknowledged.

580515A PLANT EQUIPMENT SURVEY SUMMARY

Equipment Pumps - Centrifugal

Manufacturer XYZ

Type	Size	Serial No.	Code No.	Location
ES-B	1-1/2	63958	75-825-1760	
ES-B	1-1/2	63959	75-825-1761	
ES-A	3	65140	75-825-4120	
CTC-B	4	60786	75-825-5240	
STC-A	4	65565	75-825-5440	

PLANT EQUIPMENT SURVEY SUMMARY is obtained by the dividing of information as outlined in Fig. 6. Fig. 7.

SPARE PARTS INTERCHANGEABILITY DATA SHEETS

Technical Unit
Stores Section
Manufacturing Department
The Atlantic Refining Co.

	XYZ Stock No. & Material	60786 4" CTC-B	63958 1½" ES-B	63959 1½" ES-B	65140 3" ES-A	65141, -43 4" STC-AA	65142 6" DS-CI	65565 4" STC-AA	63965 4" STC-AA	69221 4" STC-AA	69222 4" STC-A
5-736-701 RING PT. 5 OR 5A CASE RING NI RESIST FOR 4" STC-AA XYZ PUMP 65141 DWG. PA-7048 79-825-64444	3A-4479 Ni Resist					X		X	X	X	X
5-736-720 RING PT. 5 CASE RING NI RESIST FOR 8" DS-CI XYZ Pump 65142 OR 3 DWG. PA-6590 79-825-6480	3A-4936 CI						X				
5-736-800 RING PT. 5A CASE WEAR RING FOR XYZ 4" CTC-B CENT. PUMP SERIAL 60786 79-825-6460	3A-4483 Type 410 SS		X								

INTERCHANGEABILITY DATA SHEETS, which give a particular manufacturer's spare parts currently in inventory, was developed to assist cooperating manufacturers. Fig. 8.

8. Measurement of effective permeability

BY E. T. GUERRERO
Head, Department of Petroleum Production Engineering, University of Tulsa
and
F. M. STEWART
Staff Engineer, Alex McCoy Associates, Inc.

(a) Using linear flow and compressible fluid

GIVEN: A core was saturated with brine and then gas-flooded to a constant water saturation of 30%. Under these conditions it was observed that 0.1 cu. ft. of gas (measured at atmospheric pressure) flowed through the core (outside diameter = 2.54 cm., length = 12 cm.) in 2 minutes. The pressure drop across the test interval (8 cm.) of the core was 5 psi., and the viscosity of the air 0.0178 cp. Inlet pressure = 200 psia.; atmospheric pressure = 14.65 psia.

FIND: Effective permeability of the core to gas at 70% gas saturation.

METHOD OF SOLUTION: Equation 3 of Part 6 of this series (OGJ, March 2, 1959, p. 119) applies:

$$k_g = \frac{2\, p_a\, Z_m\, \mu\, Q_a\, L}{A\,(p_1^2 - p_2^2)} \qquad (1)$$

SOLUTION: Q_a, the rate of flow at atmospheric pressure and flowing temperature,

$$= \frac{(0.1\ \text{ft.}^3)\ (28{,}317\ \text{cc./ft.}^3)}{(2)\ (60)\ \text{sec.}}$$

$$= 23.6\ \text{cc./sec.}$$

$$Z_m = 1.0$$

then:

$$k_g = \frac{(2)\ (1.0)\ (1.0)\ (0.0178)\ (23.6)\ (8)}{(20.3)\ [(13.7)^2 - (13.3)^2]}$$

$$= 0.0307\ \text{darcies or } 30.7\ \text{md.}$$

DISCUSSION: Equation 1 is the same equation as was used in determining the absolute permeability of a linear core using a compressible fluid except that in this case k_g represents the effective permeability of the core to gas for the existing gas saturation.[1]

As implied, this permeability varies with gas saturation. It is not normally obtained in routine core analysis. However, it is measured occasionally in the development of gas-relative permeabilities. It can also be obtained from pressure-buildup tests of gas wells. Effective gas permeabilities are needed in evaluating the steady-state flow behavior of gas wells and with effective oil permeabilities in developing k_g/k_o relationships.

(b) Using linear flow and noncompressible fluid

GIVEN: A linear core having a diameter of 3.0 cm. and a length of 10 cm. was fully saturated with brine and then flooded with crude oil to a constant water saturation of 28%. The oil had a viscosity at test temperature of 3.0 cp. In 10 minutes 25 cc. of oil was flowed through the core using a pressure drop of 45 psi. across the test interval (7 cm.) of the core, and atmospheric pressure = 14.7 psia.

FIND: Effective permeability of the core to oil at 72% oil saturation.

METHOD OF SOLUTION: Equation 4 of Part 6 of this series applies:

$$k_o = \frac{\mu_o\, Q_o\, L}{A\,(p_1 - p_2)} \qquad (2)$$

Where:

k_o = effective permeability of core to oil, darcies

SOLUTION:

$$Q_o = \frac{25}{10 \times 60} = 0.0417\ \text{cc./sec.}$$

then:

$$k_o = \frac{(3.0)\ (0.0417)\ (7)}{(7.1)\ (3.06)}$$

$$= 0.041\ \text{darcies or } 41\ \text{md.}$$

DISCUSSION: The permeability of a media to a fluid in the presence of one or more other fluids is termed effective permeability. The same equation is used here as was used in the calculation of absolute permeability (incompressible fluid) except that now the effective permeability is obtained. Furthermore, this effective permeability is not only dependent on the nature and structure of the rock but also upon the saturation of the flowing fluid under consideration and the presence of other fluids in the pores of the rock.

Since, in all the reservoirs, two or more fluids exist in the pores of the rock, effective permeability determines their flow behavior. This being the case one could ask why is absolute rather than effective permeability measured in routine core analysis. The reason is that the former is constant and easy to measure whereas the latter is normally a variable and considerably more difficult to measure. The latter is at times determined from production data or pressure-buildup tests.

Effective permeabilities (when available) are used to solve the steady-state equations to determine an estimate of the rate of oil flow for a certain pressure drop or the pressure drop that can be expected for a certain rate of oil flow. The accuracy of the results obtained depend primarily on the ability of the operator to stabilize the well and approach steady-state flow. Other uses of effective permeabilities are (1) to compute productivity index, (2) to develop relative permeabilities, and (3) to determine k_g/k_o and k_w/k_o relationships.

Reference

1. Muskat, M., Physical Principles of Oil Production, McGraw-Hill Publishing Co., pp. 271-274.

HERE'S

automatic (LOW COST) sealing for you

MISSION VALVES

Here's a valve that thinks for itself. A valve that is always working for you without costly maintenance, without constantly being nursed. The Mission Valve is always ready to seal. And what's more, the higher the pressure, the tighter the seal.

Why? Because line pressure forces Mission Sealant through two semi-circular grooves around the downstream port, sealing like a plastic packing, to form a gas-tight seal. Leaks are stopped automatically before they start.

The two spherical cylindrical cores, acting like a gate, are wedge proof, allow easy opening and closing even under pressure. The complete line of 315 Mission Valves brings the positive advantages of easy opening and tight sealing to practically all valve applications. This wide selection, the Mission Guarantee, and the Mission Renewal Policy combine to make Mission Valves your best buy. Specify Mission and eliminate your valve problems.

Nothing but the finest will bear the name of MISSION MANUFACTURING CO.

SEE OUR EXHIBIT

MAY 14-22, 1959
Tulsa, Oklahoma

MISSION MANUFACTURING CO., P. O. Box 4209, Houston, Texas • Cable Address—"Missco" • Export Office: 30 Rockefeller Plaza, New York
In The United Kingdom: MISSION MANUFACTURING CO., LTD., 17 Hanover Square, London, W. 1 England • Cable Address—"Missoman"

PISTONS • PISTON RODS • SLIPS • GLAND PACKINGS • LINERS • LINER PACKING • PUMP VALVES AND SEATS • SWABS • VALVES • HAMMERDRILS • CENTRIFUGAL PUMPS

59—201

The bank with the
OIL MAN'S
point of view.

FIRST CITY
NATIONAL **BANK** OF HOUSTON

Loans on oil or gas producing properties, secondary recovery, refining plants, pipe lines and many others.

HOUSTON, TEXAS

MEMBER
FEDERAL DEPOSIT
INSURANCE CORPORATION

BY W. L. NELSON, Technical Editor and Petroleum Consultant

Questions on TECHNOLOGY

Gas produced in platinum catalyst reforming

Your answer of August 26, 1957, "Platinum Reforming Yields at High Octane Number," does not show the amount of hydrogen and dry gas produced. Have you summarized the gas production in some other answers? F.W.T.

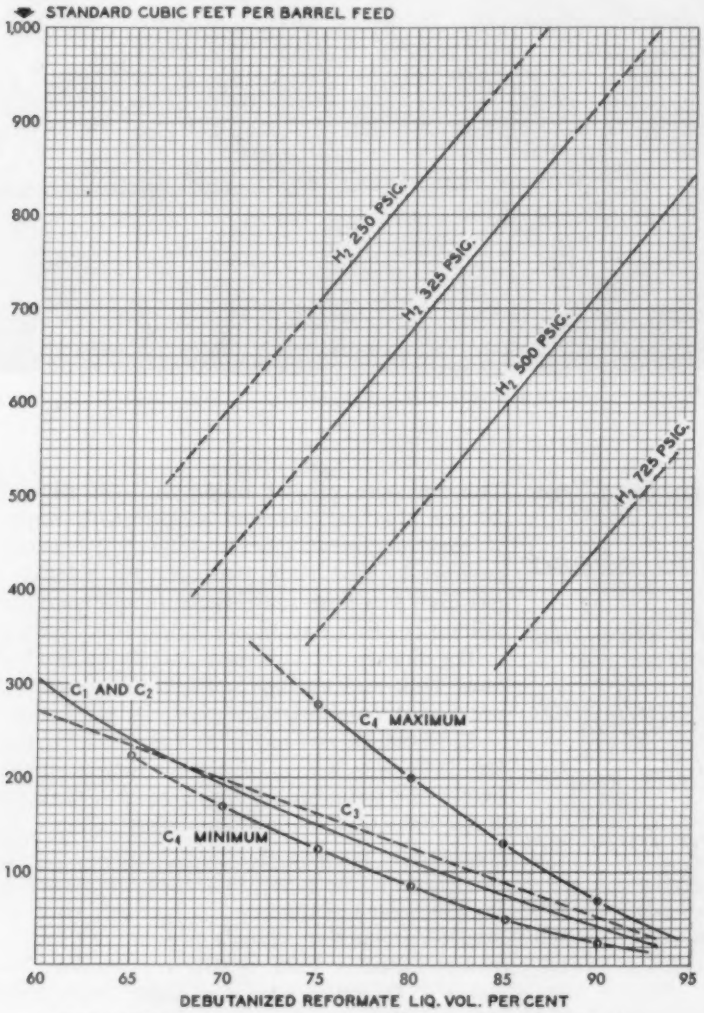
The amount of methane, ethane, and propane that will be produced can be predicted with good accuracy using the lines of Fig. 1, but the amount of hydrogen produced is only most approximate. The lines for hydrogen on Fig. 1 are so gross that they might have been drawn almost horizontal, as well as sloping as shown. In addition, the hydrogen lines are accurate to only about plus or minus 20%. The inaccuracy may be due to variables which have not been completely explored, but a main reason for the inaccuracy is probably the mechanical difficulties encountered in measuring the weight of hydrogen. One pound of hydrogen occupies nearly 190 cu. ft.

Gas analyses, based on Fig. 1, are shown in Table 1.

The split between iso and normal butanes, and the amount of unsaturates has been discussed in earlier issues of this page (OGJ, "Platinum Reforming Yields at High Octane Number," Aug. 26, 1957, p. 129, and "Iso Hydrocarbons in Reformer Gases," Oct. 21, 157, p. 135).

TABLE 1—ANALYSES OF GASES FROM CATALYTIC REFORMING.

Debutanized reformate, liq. vol. %	Reactor pressure, psig.	Gas volume per cent		
		Hydrogen	Methane and ethane	Propane
70	325	47.0	31.4	21.6
70	250	54.6	26.9	18.5
75	500	53.4	22.6	24.0
75	325	64.4	17.2	18.4
75	250	69.6	14.7	15.7
80	500	67.0	15.5	17.5
80	325	74.5	12.0	13.5
80	250	78.0	10.4	11.6
85	725	66.7	15.1	18.2
85	500	78.4	9.8	11.8
85	325	82.9	7.8	9.3
85	250	85.2	6.7	8.1
90	725	83.3	7.4	9.3
90	500	88.9	4.9	6.2
90	325	91.0	4.0	5.0
90	250	92.1	3.5	4.4
95	725	94.1	2.0	3.9
95	500	96.0	1.4	2.6
95	325	96.6	1.1	2.3

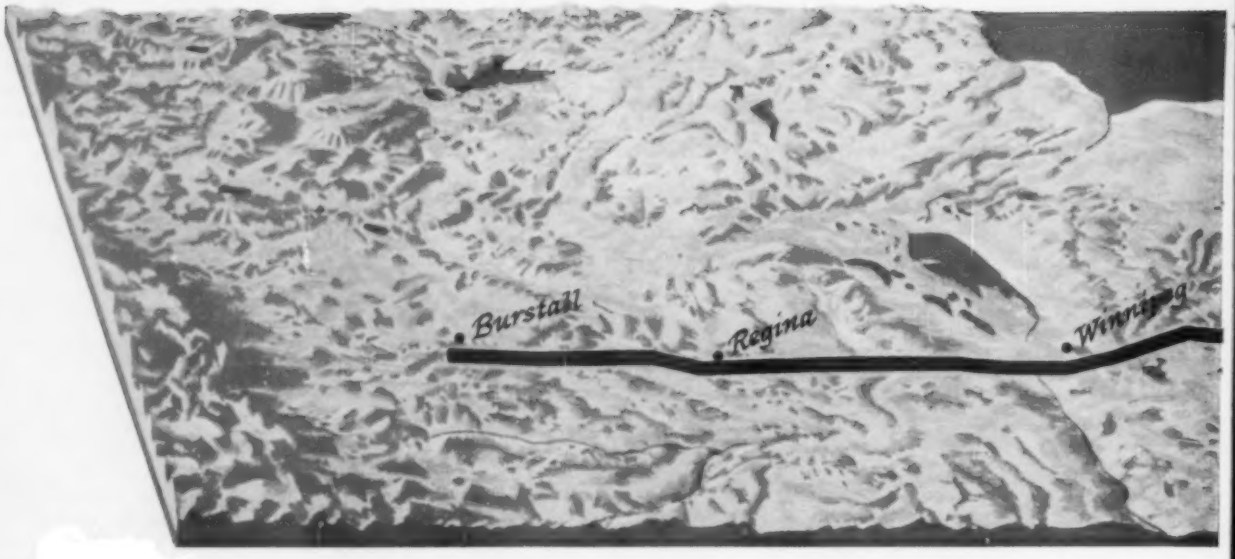


DRY GASES produced in platinum-catalyst reforming. Fig. 1.

References

1. Anon.—New Cat Reforming Process Unveiled, The Oil and Gas Journal, Mar. 5, 1956, p. 62.
2. Anon.—Catalytic Reforming at Muskegan Refinery, Pet. Refiner, April 1950.
3. Anon.—Powerforming for Octanes, Pet. Processing, June 1957, p. 117.
4. Anon.—New Catalytic Reformer Produces Aromatics. Pet. Engineer, Apr. 1951, p. C-47.
5. Donaldson et al.—Dehydrocyclization in Platforming, ACS meeting, Sept. 11, 1954, New York.
6. Forrester et al.—Ultraforming, The Oil and Gas Journal, Apr. 12, 1954, p. 139.
7. Fowle et al.—It's the Catalyst That Counts, The Oil and Gas Journal, May 26, 1952, p. 181.
8. Logan et al.—Catforming at United Refining Company, Pet. Refiner, Sept. 1955, p. 169.
9. Nix, H. C.—Regenerative Platinum Catalyst Reforming, Pet. Engineer, June 1957, p. C-13.
10. Teter et al.—New Catalytic Reforming Process, The Oil and Gas Journal, Oct. 12, 1953, p. 118.

←22 tortuous



Trans-Canada Pipe Lines completed ahead of schedule despite shifting sands, diamond-hard rock, white water and tricky muskeg

This immense project began in 1954 when 76 miles of 20-inch pipe was laid from Niagara to Toronto. Since then — construction has proceeded ahead of schedule and within estimated costs. Today, Alberta natural gas, rather than gas from American sources, can be delivered at rates of 620 million cu. ft. a day through the main 30- and 34-in. line.

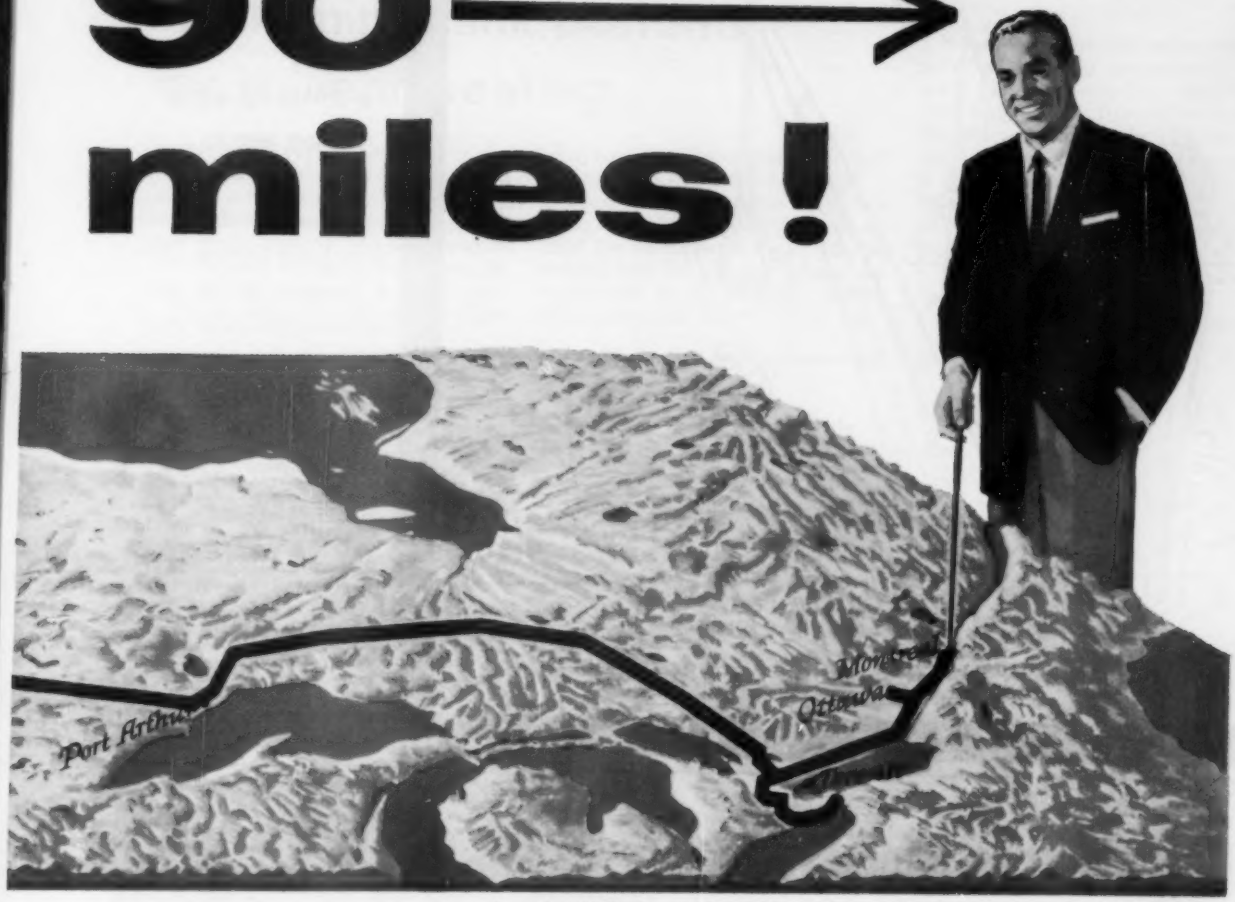
The line spans turbulent rivers, the Great Sand Hills, hard rock and spongy muskeg. Frequently, the work progressed despite temperatures to 48° below zero.

A. O. Smith was one of the major suppliers of pipe for this 2290-mile line which is now delivering natural gas to homes and industries along its route — an area containing three-fifths of Canada's population.

For over 30 years . . .

A. O. Smith line pipe has always been manufactured to a high standard of quality . . . precisely controlled at every step of production. That's why A. O. Smith pipe, made and installed in 1928, is still in operation. That's why so much A. O. Smith pipe is in nearly every important high-pressure line.

90 miles!



Spanning 2290 miles, the Trans-Canada line reaches from the Province of Alberta to Montreal . . . and proposed additions will extend the line as far east as Quebec.

Typical of nature's efforts to thwart completion of the line were temperatures ranging to 48° below zero. Nevertheless, work progressed ahead of schedule and below estimated costs.

The formidable Laurentian Shield was blasted, ripped, drilled and shattered to make way for Canada's longest natural gas pipeline. Going was rough, but the rewards for Canadians were far greater.

Through research A.O. Smith *. . . a better way*

A.O.Smith
CORPORATION

TUBULAR PRODUCTS DIVISION

Milwaukee 1, Wisconsin

Chicago 3 • Dallas 35 • Houston 2 • Los Angeles 17 • Midland 5, Texas • New Orleans 12 • New York 17 • Tulsa 3 • A. O. Smith INTERNATIONAL S. A., Milwaukee 1, Wisconsin, U. S .A.

"I DON'T KNOW WHAT IT IS, BUT IT CAME FROM CROSE... THEY HANDLE EVERYTHING!"

IF IT'S NEW AND BETTER, CROSE MADE IT!

In the pipeline construction industry around the world, Crose is recognized as the manufacturer of new, better equipment . . . equipment that is always rugged and dependable, gets the job done faster and more economically.

Crose

MANUFACTURING COMPANY, INC.

2765 Dawson Road • Phone WEbster 6-2171 • Tulsa, Oklahoma • BRANCH OFFICES: Houston • Denver • Elizabeth, N. J. IN CANADA: Crose-Curran Ltd., Edmonton, Alberta

Oil Industry's Handiest Tool!

Thompson Vacuum Tanks handle liquids and semi-solids in MINUTES instead of hours!

"It's our handiest tool!" That's what they're saying about the Thompson Unitized Vacuum Tank, and once you've tried it, you'll agree. There's absolutely no substitute when it comes to moving liquids and semi-solids in a hurry.

- *Jobs which once took hours are now on the way in minutes.*
- *Jobs which once called for crews are handled by a single driver-operator.*

Versatile vacuum is a real "go-getter" in all departments: refining, drilling, producing and pipeline. Fast pick-up, transport and discharge make the Unitized Vacuum Tank indispensable to modern cost-conscious operations.

Write today for specifications and the name of those in your area who are operating a Thompson Vacuum Tank. See it in action.

THERE IS A THOMPSON UNITIZED VACUUM TANK FOR YOUR NEEDS. CAPACITIES RANGE FROM 20 TO 100 BBL. COMPLETE UNITS CAN BE SKID, TRUCK, SEMI-TRAILER OR TRAILER MOUNTED.

Sole Licensee to Manufacture Vacuum Tanks Under U. S. PATENT NO. 2522077.

PIPELINING

Reclaiming tank bottoms by solvent treating

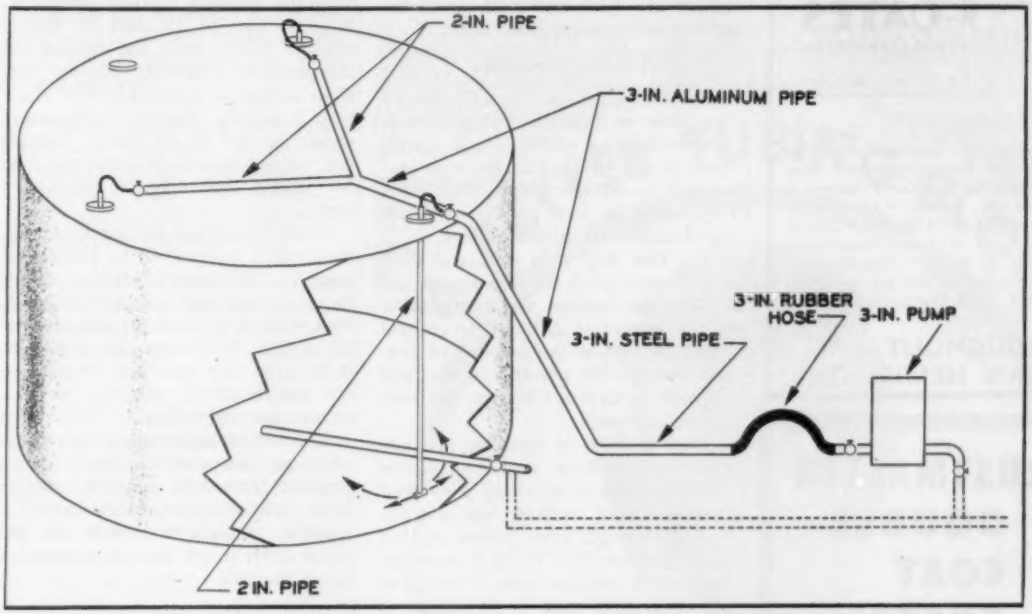
BY GENE KINNEY
Assistant Pipeline Editor

COMPARATIVELY few large crude-oil storage tanks have been cleaned out by solvent treating instead of by mechanical means or by heating. In a few years, however, the new practice may become widespread in pipelining and refining as it has in production.

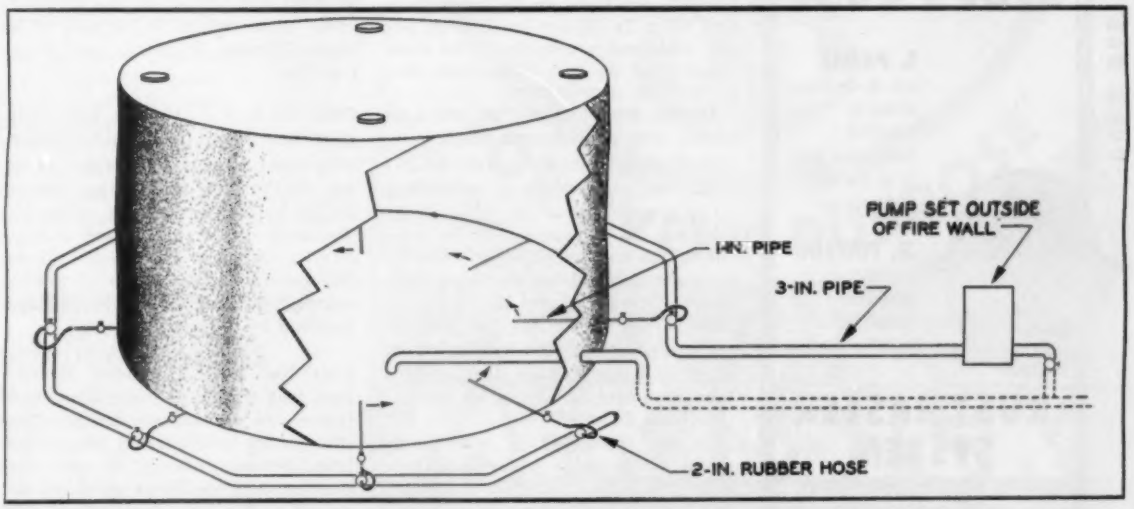
In the solvent-treating method, paraffin buildup is torn from the tank bottom by agitation, exposed to a chemical which suspends it in oil again, and is absorbed by fresh oil. Then the reclaimed bottoms can be pumped into the pipeline stream and transported to the refinery without fallout down the line.

Some 30 pipeline and refinery tanks have been treated successfully with one paraffin-suspending chemical. They range in size from 5,000 to 80,000 bbl. and tanks in the 170,000-bbl. size will be treated this year. Generally 65 to 85% of the bottoms are reclaimed. Most companies that have had experience with this method of handling paraffin buildup plan to use it further. Here are the reasons that they offer:

- Paraffin is recovered instead of



IN DOWN-LINE TYPE OF INSTALLATION, oil is pumped from the tank suction line and returned through lines which extend down hatches. It is generally applied on smaller tanks. Fig. 1.



IN MANIFOLD-TYPE INSTALLATION for tank bottom recovery, oil is pumped from the tank through a pipe which encircles the tank, and reenters through taps made in the base of the tank. It can be used on any size tank and is considered more effective than the down-line type of installation. Fig. 2.

ENGINEERING AND LAND SERVICES

LOCKWOOD-KESSLER & BARTLETT, INC.
One Aerial Way
SYOSSET, L. I., N. Y.

COATES Field Service, INC.
P.O. BOX 1691 OKLA. CITY

Consulting • Planning & Design • Route Studies & Selection • Aerial Photography • Photogrammetric Survey & Mapping • Ground Survey • Construction Supervision • Land Evaluation Studies • Title Search • Survey Permits • R/W & Land Negotiation • Easement & Permit Acquisition • Damage Claims Settlement • Establishment of Land-Owner Good Will.

THROUGHOUT THE WESTERN HEMISPHERE!

'RUSS MASTER' SAYS...

RUSTMASTER DOUBLE-COAT SYSTEM STOPS RUST

1. PRIME with Rustmaster, proved by laboratory comparison tests to be the best rust inhibitor!

2. FINISH with one of General's specialized industrial coatings.

RUSTMASTER SYSTEM

Ask for details and specifications.
GENERAL PAINT CORP.
Tulsa and San Francisco

being burned or otherwise disposed of if there is no market for the bottoms.

- Higher wax content of the crude is desirable to the refiner.
- Tank space can be used during cleaning. The tank is not opened up and does not need to be taken out of service.
- Safety is improved.
- Labor and equipment needs are reduced.
- A large per cent of the accumulations are recovered without transporting and treating-plant cost.

Treating Procedure

The technique used by one service contractor on a tank in Oklahoma was described in an earlier article (OGJ, April 6, p. 161). The methods developed by BrakeSol, Inc., Oklahoma City, using its own paraffin-suspending chemical, are presented here.

The first step is to gage and thief a tank and grind out samples to determine the amount and composition of the bottom at different levels and locations. When the amount of bottom and the oil, paraffin, water, and sediment content are known, recovery can be estimated.

Two methods of agitation and circulation have been used. One is the down-line type in which oil is pumped from the tank suction line and returned through lines which extend down hatches (Fig. 1). It is generally applied on smaller tanks. The other is a manifold type in which oil is pumped from the tank through a pipe which encircles the tank and reenters through taps made in the base of the tank (Fig. 2). It can be used on any size tank and is considered the more effective of the two. Sometimes they are used in combination.

In the down-line method the tank suction line is connected to the suction of a pump set up outside the fire wall. The pump discharge is connected to a manifold at the center of the tank top. Aluminum pipe or hoses are run to all hatches through which jet lines are installed for playing a high-pressure stream against the bottom to break it up. A tee may be used on the end of the jet lines, which are rotated to cover a wide area. Valves permit control of circulation through individual lines.

In the manifold-type method the pump discharge is hooked up to a 3-in. pipe which encircles the tank a few feet from its base. The tank is tapped near the bottom at four to eight points, depending on its size. A 1-in. jet line, connected to the 3-in., is installed through the tap. A disk is welded on the end of the jet line and a hole is drilled through the disk. Another hole is drilled through the pipe wall near the end. The jet line can be rotated to direct flow and moved in and out to reach maximum bottom area. Lines can be operated singly or together as needed.

In either method, at the start of treatment the tank should contain just enough oil for good circulation. A big slug of chemical is injected on the suction side of the pump to thin the bottom. Circulation and agitation continue, with more chemical added, until the bottoms become pumpable. Progress can be checked by testing samples taken from the bleeder on the pump to determine whether paraffin content is increasing. For effective treatment the oil temperature should be 70° F. or above. Natural gas, where available, is sometimes used for jetting, especially on production tanks.

When the bottom has been torn up, fresh oil is pumped in to absorb the paraffin. The tank is allowed to settle until water and sediment drop out, then water is drained off and pipeline oil is run. If the amount of bottom is so large that one tank of oil cannot absorb all the paraffin, the procedure may be repeated.

The bottom must be torn up so that chemical comes in contact with all paraffin, and there must be enough fresh oil available to absorb suspended paraffin. Otherwise it will fall out again either in the tank or somewhere down the line.

Case Histories

Results of these methods are summarized in the following reports which cover tanks treated in Indiana, Oklahoma, Illinois, Wyoming, and Pennsylvania:

Case No. 1: A 37,500-bbl. tank treated in three stages by manifold method, with tank run after each stage. Average bottom: before treating, 90 in. (9,770 bbl.); after treating, 3,256 bbl. Recovery 6,514 bbl., valued at $20,519.10; chemical cost $1,567.50 for 660 gal. (includes services of treating engineer but not labor and materials supplied by pipeline company).

Case No. 2: A 35,000-bbl. floating-roof tank treated by a combination of methods, including jetting lines through leg holes and air jetting. Bottom: before treating, 56 in.; after treating, 3.75 in. Recovery 5,538 bbl. valued at $16,614; chemical cost $3,491.18 for 1,540 gal.; labor and materials $1,776.98.

Case No. 3: A 35,000-bbl. tank treated as in Case No. 2. Bottom: before treating, 54 in.; after treating, 6.6 in. Recovery, 5,024 bbl., valued at $15,072; chemical cost $2,492.88 for 1,100 gal.; labor and materials $1,390.46.

Case No. 4: A 35,000-bbl. tank treated in the same manner. Bottom: before treating, 67.5 in.; after treating, 7.75 in. Recovery 6,333.5 bbl. valued at $19,000.50; chemical cost $2,868.80 for 1,265 gal; labor and materials $2,470.95.

Case No. 5: A 35,000-bbl. tank treated by a combination of methods. Bottom: before treating, 79 in.; after treating, 36 in. Recovery 4,558 bbl. valued at $12,762.40; chemical cost $2,171 for 835 gal.; labor and materials not reported.

Case No. 6: A 5,000-bbl. tank treated with three down lines. Bottom: before treating, 48 in.; after treating, 8 in. Recovery 680 bbl. valued at $2,040; chemical cost $412.50 for 165 gal.; other costs not reported.

Case No. 7: A 15,000-bbl. tank treated with 165 gal. of chemical. Bottom: before treating, 24 in.; after treating, 8 in. Recovery 568 bbl. valued at $1,704.

Case No. 8: A 37,500-bbl. cone-roof tank treated in 10 stages by manifold method. Bottom: before treating, 114 in.; after treating, 26 in. Recovery 8,208 bbl. valued at $23,803.20, with 1,296 bbl. of water drained off; chemical cost $4,702.50 for 1,980 gal.; other costs not reported.

Case No. 9: 35,000-bbl. tank; recovery 5,538 bbl. valued at $16,614; chemical cost $3,491.18 for 1,540 gal.; labor and materials $1,776.98.

Case No. 10: A 35,000-bbl. tank; recovery 5,024 bbl. valued at $15,072; chemical cost $2,492.88 for 1,100 gal.; labor and materials $1,390.46.

Case No. 11: A 35,000-bbl. tank; recovery 6,333 bbl. valued at $19,000; chemical cost $2,868.80; labor and materials $2,470.95.

Planning can mean pipeline savings

RELOCATION of pipelines because of highway construction is always a problem. But it will be magnified many times during the next decade as the nation's 41,000-mile interstate system is built.

A taste of what is to come was experienced last year by Northern Illinois Gas Co. during construction of the Illinois Tollway system, a part of national network which will link key U.S. cities. Northern Illinois gas lines had to be rerouted at 121 points.

By advance planning and careful coordination, the company made the necessary system changes so that toll roads could be built without interruption of gas service. The system revisions were first studied more than 2 years ago and were completed last year in about 6 months.

Key to success of the program was cooperation between the gas company and toll-road engineers and contractors. The company as a first step appointed an official contact with toll-road personnel. He coordinated paper work required for revisions. The engineering department planned the actual work and division operating personnel followed through on field work with toll-road contractors.

Most revisions were made before earth-moving equipment started carving out the super highway route so that the two operations would not interfere with each other.

On the Job

PIPELINING

The Image of CF&I *assures top quality in*

SEAMLESS
CASING AND TUBING

The CF&I giant stands for skill and long years of experience in producing quality steel products. And in the petroleum industry, users have learned to rely on CF&I's craftsmanship for straight, strong and "true" seamless casing and tubing.

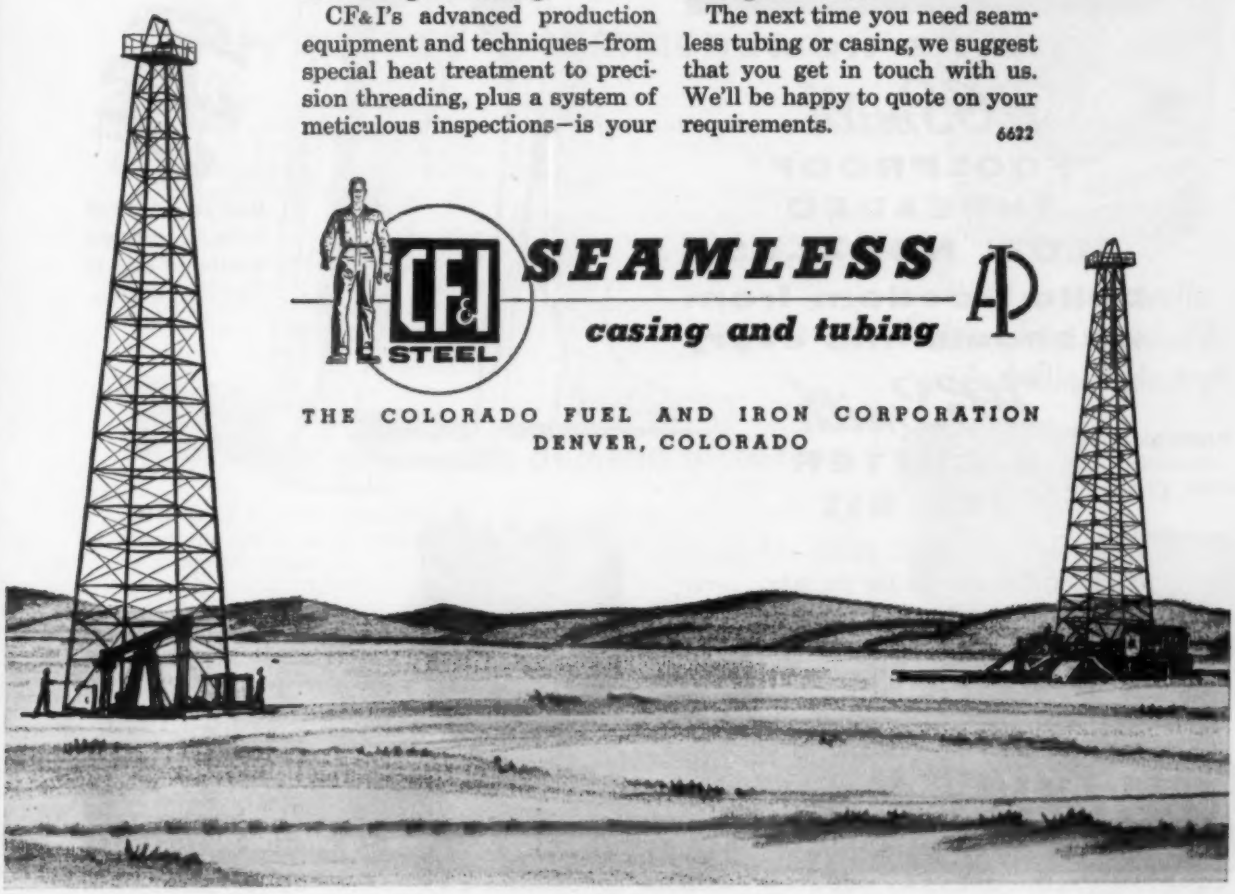
CF&I's advanced production equipment and techniques—from special heat treatment to precision threading, plus a system of meticulous inspections—is your guarantee of quality casing and tubing. Made from top quality steel, CF&I Seamless Casing and Tubing are subjected to rigid manufacturing standards and meet API STD 5A specifications. They are available in sizes 2⅜" through 9⅝" O.D.

The next time you need seamless tubing or casing, we suggest that you get in touch with us. We'll be happy to quote on your requirements.

6622

CF&I STEEL **SEAMLESS** casing and tubing API

THE COLORADO FUEL AND IRON CORPORATION
DENVER, COLORADO



"ARMORED" FOR LONGER LIFE

SEE OUR EXHIBIT

International Petroleum Exposition

MAY 14-23. 1959
Tulsa, Oklahoma
Booths 10 and 11
California Bldg.

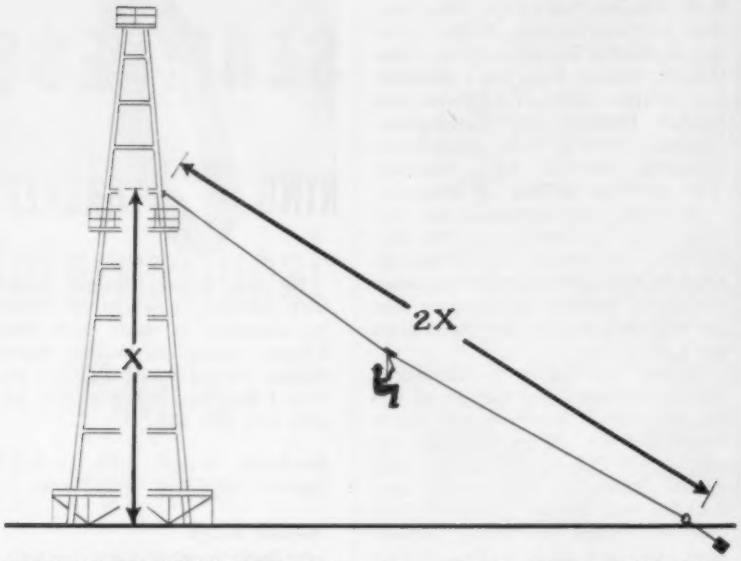
THAT'S HOW H C Smith "FOOLPROOF" THREADED FLOW NOZZLES build freedom from washouts into every H C Smith 3-CUTTER JET BIT

Two years ago, H. C. Smith introduced threaded flow nozzles for jet bits . . . ever since, their freedom from washouts has been proved in oil fields throughout the world. Ask the drillers who use them!

H C Smith OIL TOOL CO.
Branches in Principal Oil Centers Throughout the World

-every bit the best

COMPTON, CALIF. • ODESSA • HOUSTON • DALLAS • OKLAHOMA CITY • GREAT BEND • EDMONTON



RECOMMENDED INSTALLATION of an escape mechanism. Source, AAODC Safety Hints.

Safety escape recommended

DATA for a recommended type of derrickman safety escape have been provided by the AAODC. The cable trolley should be in starting position approximately 5 ft. above the railing in the rig. Cable recommended is either 7/16-in. or ½-in. plow steel standard, six strand. The cable should have some slack, preferably small in amount, but cable should not be tight.

Dead man, either permanent or temporary, should support a track cable pull of 3,000 lb. This will require a horizontal-bearing surface of 4 to 7 sq. ft., a minimum of 3 ft. below surface.

Trolley should be mounted in correct position with the brake handle on the right side so that it is necessary to push forward and upward to release the spring-controlled brake. A proper installation relieves derrick man of worry and will enable him to get down safely and fast.

Mississippi drilling rig demand increases

INTEREST in Mississippi is due primarily to past successes which have increased the state's oil reserves appreciably. Signposts indicate that exploration in the Magnolia State is growing. No slowup is seen in the near future.

The healthy status of drilling activity is shown by the following drilling figures: A comparable week in 1958 had 19 wildcats and 19 field tests digging, giving a total of 38 rigs. This same week a year later tallies 29 wildcats and 51 development wells in progress, a total of 80 rigs. In Pike County alone, there are 14 rigs active, or more than all the wells drilled in this area before January 1, 1958. New reserves have stimulated the search creating a demand for more drilling rigs.

In keeping with the program designed primarily for depths of 12,000 ft. and deeper, rig activity is up. Both new companies moving into the area and present operators increasing their number of rigs prove the faith operators have in Mississippi.

Contractors now operating in the state in the past 12 months include: Big Chief Drilling Co., Oklahoma City; Rex Drilling Co., Shreveport; Offshore Drilling Co., New Orleans; Reading & Bates Offshore Drilling Co., New

When you see this being done-

chances are it's with

"500 TON"

USED on more wells throughout the world-wide drilling industry!

Sold ONLY through supply stores

MONEY BACK GUARANTEE!

USE JIMMIE GRAY DOPE BRUSHES

PETROLEUM DISTRIBUTING CO.

BOX 203 • HOUSTON, TEXAS

HYCALOG DIAMOND
CORE BITS

WIRE LINE CORING RECOVERS MORE CORE... FASTER IN GULF AREA

High penetration rates were maintained on these seven wells... *with Hycalog diamond wire line coring bits*... and drill strings didn't have to be pulled for bit changes until coring was completed. Located in Webb, Matagorda, and Orange Counties, Texas, and St. Charles Parish, Louisiana, they are typical of coring jobs throughout the Gulf area.

SIZE BIT	NO. CORES CUT	FEET CUT	% RECOVERY	AVERAGE FT./HR.
7⅝ x 1¾	10	129	100.	7.15
7⅝ x 1¾	12	130	97.	8.25
6¾ x 1¾	5	62	99.9	4.65
7⅝ x 1¾	17	155	80.	5.24
7⅝ x 1¾	37	465	95.5	4.2
7⅝ x 1¾	32	463	87.	6.9

Why not let Hycalog diamond core bits set a record on your next coring program? *And ask us about Hycalog* GAS CHRONO-FRAC *well logging services.*

Hycalog, Inc.
505 AERO DRIVE
SHREVEPORT, LOUISIANA

BRANCH OFFICES IN PRINCIPAL OIL PRODUCING AREAS

DIAMOND BITS DIAMOND CORING
WELL LOGGING CORE ANALYSIS

Orleans; Travis Ward Drilling Co., Athens, Tex.; Barnwell Drilling Co., Shreveport; Rowan Drilling Co., Fort Worth; Goldrus Drilling Co., Houston; R. E. Williams Drilling Co., Magnolia, Ark.; Loffland Brothers, Tulsa; Louisiana Drilling & Exploration, Inc., New Orleans; Crown Rigs, Inc., Houston; J. C. Trahan Drilling Co., Shreveport; Strahan Drilling Co., Birmingham; Fletcher Drilling Co., Shreveport; Bankhead Drilling Co., Houston; Winn Hawkins Drilling Co., Houston.

Most of these companies are currently busy. In addition to the contractors, two major oil companies, Ohio Oil Co. and Magnolia Petroleum Co., have brought in company rigs for their exploration and exploitation work.

Active contractors in Mississippi who have swelled the number of rigs running include those with new rigs or reactivated rigs. Those with new rigs are: Arrow Drilling Co., Tulsa; Gulf Coast Drilling & Exploration, Inc., Jackson and Laurel; Dorris Ballew, Natchez; Woolf & Magee, Shreveport; Williams Drilling Co., Mobile and Jackson; Zach Brooks Drilling Co., El Dorado, Ark.; Sunnyland Contracting Co., Rayne, La.; Rimrock Tidelands, Inc., New Orleans; Jett Drilling Co., Inc., Shreveport; and Larco Drilling Co., Jackson.

Some of the reactivated rigs moved in have been idle either in this state or a bordering one. These include: Arrow Drilling Co., Tulsa; Deckard Drilling Co., Jackson; Marshall R. Young Drilling Co., Fort Worth and Brookhaven; Index Drilling Co., Laurel; LaGrange Petroleum Co., Natchez; and Cook Drilling Co., Fort Worth.

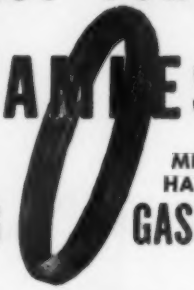
The drilling flurry may well qualify Mississippi as a leading contender for the hot spot in the nation. It is a healthy sign that contractors welcome.

Reading & Bates gets new equipment

Reading & Bates Offshore Drilling Co. has acquired a new tender and rig through lease from the Llano Drilling Co., Midland, Tex., to replace equipment which previously capsized. The new tender and drilling rig, the Clayton D. Dorn, will operate in Block 208 of the Eugene Island area, offshore Louisiana. With the new equipment, R. & B. is again operating three rigs in the Gulf of Mexico.

J. W. Bates, Jr., president, also stated that the company's equipment enroute to the Persian Gulf safely passed through the Straits of Gibralter. The first well is scheduled for spudding in May in the Kuwait-Saudi Arabia Neutral Zone.

"SCOT" FORGED SEAMLESS RING GASKETS



MINIMUM HARDNESS

For ring Groove Flanges forged from reforging billets in the following materials in stock: Soft Steel, Copper, Aluminum, Inconel, Monel, Nickel; 1¼ Cr ½ Mo., 2¼ Cr 1 Mo., 9 Cr 1 Mo. 304, 310, 316, 321, 347, 405, 410, 430, 502.

Machined in all A.P.I. — A.S.A. Special sizes and other type.

Available through your Supply Store

SOUTHERN CALIFORNIA OIL TOOL COMPANY
8220 Atlantic Boulevard
P. O. Box 30, Bell, California

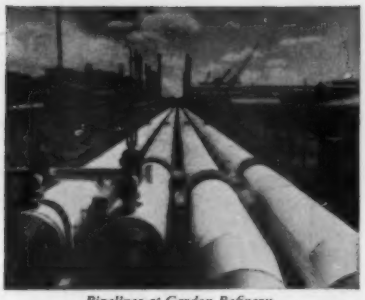
THIS FILE HOLDS 2000 ELECTRIC LOGS

KRAFTBILT E-24 holds 2000 full-sized logs (Schlumberger, Lane-Wells, Halliburton or others). Separate follow-blocks in each drawer give eight drawer efficiency. Extra-strong extension for fingertip control, easy sliding. Fire resistant all-steel construction.

Other electric log file cabinets available — also custom-made file folders and dividers for greatest efficiency.

For CATALOG 59-B, write:
Dept. J-449

ROSS-MARTIN COMPANY
P.O.BOX 800 TULSA 1, OKLAHOMA



Pipelines at Cardon Refinery
Compania Shell de Venezuela Ltd.

International Paints for the OIL INDUSTRY

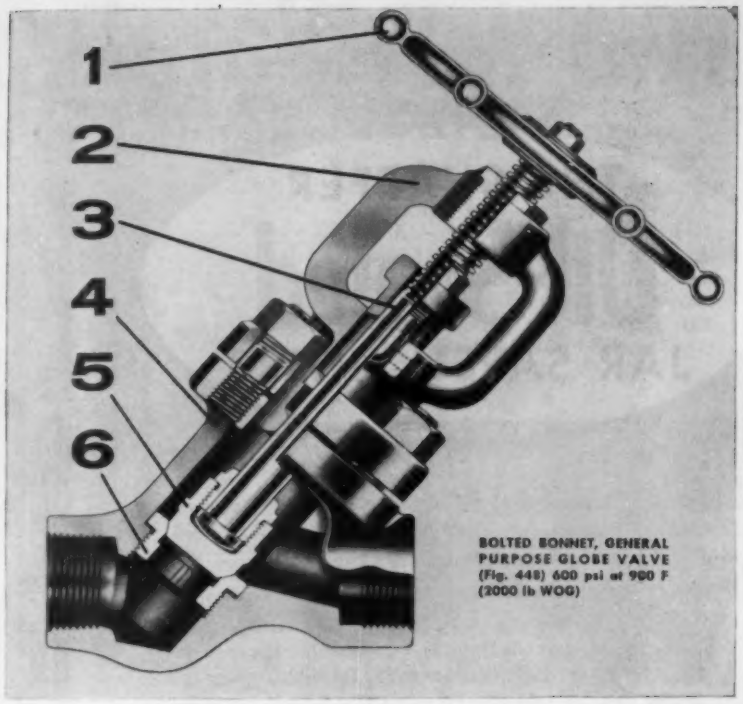
GROUP 37

With its hot sun and abrasive sand, Venezuela is hardly the ideal spot for costly equipment. Yet plant must be maintained there and protection is worth its weight in gold. Group 37 is one of the most important of International's protective paints for the oil industry. Based on epoxide resins it has all the qualities of hardness, flexibility and resistance to chemicals, abrasion and corrosion for which these specialised paints are already so well known.

NEW YORK:
INTERNATIONAL PAINT CO., INC.
21 WEST STREET, NEW YORK 6, N.Y.
MONTREAL:
INTERNATIONAL PAINTS (CANADA) LTD.,
6700 PARK AVENUE, MONTREAL.

LONDON: INTERNATIONAL PAINTS EXPORTS LTD., GROSVENOR GARDENS HOUSE, S.W.1.

A World-wide Paint Organisation with 24 factories throughout the World.



BOLTED BONNET, GENERAL PURPOSE GLOBE VALVE (Fig. 448) 600 psi at 900 F (2000 lb WOG)

You need less maintenance with...

Edward Globe Valves for petroleum services

For hundreds of petroleum services from oil field to refinery, Edward globe valves give longer, trouble-free service at less cost. Here are some reasons why:

1 Handwheel of malleable iron is properly proportioned and knobbed for easy gripping

2 Forged steel yoke withstands rugged service

3 Stem is wear resistant EValloy 13% chromium stainless steel

4 Body of forged steel is streamlined for minimum pressure loss

5 Disk of 13% chromium stainless steel or chromium-cobalt-tungsten alloy steel is also available with Stellite hard surface

6 Replaceable seat is made of wear-resistant EValloy 13% chromium stainless steel or hard-surface Stellite. Integral Stellite seat also available

UNION BONNET, INSIDE SCREW GLOBE VALVE (Fig. 2698) 600 psi at 900 F (2000 lb WOG)

MANY FEATURES AVAILABLE—
With Edward globe valves you have a wide selection of features.

- inside screw or O.S. & Y. construction
- screwed ends or socket welding ends
- bolted bonnet (shown above) or union bonnet (below)
- backseat stem or disk-nut shoulder for repacking under line pressure
- ratings to 2500 psi at 1050 F, 10,000 lb WOG
- sizes from ¼" to 2"

Edward builds a complete line of cast and forged steel stop, check, and stop-check valves for all pressures and temperatures.

For additional information, see your favorite distributor, or write for Globe Valve Bulletins 551 & 14G to Edward Valves, Inc., 1212 West 145th Street, East Chicago, Indiana. Subsidiary of Rockwell Manufacturing Company.

EDWARD STEEL VALVES
another fine product by
ROCKWELL

Two-way Safety

FOR FISHING, TESTING AND DIAMOND CORING OPERATIONS...

THE SHAFFER Oil-Sealed JAR SAFETY JOINT

. . . a two-purpose tool — *Up-Jar and Safety Joint* — in which all operating parts are sealed in oil — permanently protected against mud, sand and corrosion! Here are the highlights:

The Shaffer Oil-Sealed Jar Safety Joint offers all the "two-tools-in-one" features—and the many other advantages of the original Jar Safety Joint first developed by Shaffer years ago. It can be used in testing, fishing, diamond coring or other operations to deliver a sharp upward blow for freeing the string whenever it becomes stuck . . . and, as a Safety Joint, can be readily released in the event the string cannot be loosened.

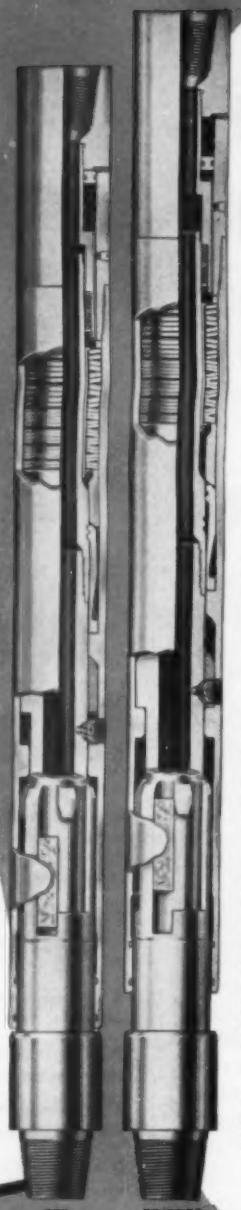
Both these operations—Jarring and Releasing—are performed under the positive control of the operator, and either action can be selected at his discretion.

MECHANISM COMPLETELY OIL-SEALED

To protect the mechanism against the corrosive and abrasive actions of mud, sand and grit, all operating parts are now sealed in a chamber filled with clean oil. At even the greatest depths and highest fluid pressures, this oil-filled chamber prevents the drilling mud from contacting the internal mechanism of the Jar Safety Joint because the oil in the chamber automatically "balances" the varying hydraulic pressures in the well so that packing units are not subjected to excessive pressure differentials.

Result . . .

1. There is [illegible] change in "tonnage trip-off" or other characteristics as operating depths increase.
2. Abrasive mud, sand and grit—corrosive chemicals and salts—never contact the operating mechanism. This assures longer life, negligible maintenance.
3. The packing, not being subjected to excessive pressure differentials, lasts much longer and remains leak-proof at even great depths.



SET POSITION — TRIPPED POSITION

Other important advantages

In addition to its Oil-Sealed design, these advantages are also typical of the Shaffer Oil-Sealed Jar Safety Joint . . .

- Jarring action is automatic and positive. To deliver a sharp upward blow, it is only necessary to raise the string until tension is equal to the pre-set tripping load of the tool, whereupon the blow is struck. Lowering the string again re-sets tool for another blow—and repeated blows can be struck as fast as the string can be raised and lowered.
- Only *straight pull* is necessary to operate the tool. No torque or other secondary operations are needed—particularly important on fishing, testing and similar strings where light connections are used.
- The force of the blow is absorbed by integral knocker heads built into the tool—not by easily-damaged drive-keys or threaded elements.
- The Shaffer Oil-Sealed Jar Safety Joint does not depend upon friction for its tripping action. Therefore the tool is not subject to variable operating characteristics. Its action is dependable, uniform, fool-proof!
- The Safety Joint portion has important advantages over conventional safety joints. No threads are used in the releasing mechanism—therefore there's no risk of overtightening by torque. Nor is there risk of accidental release by reverse rotation. Yet when simple releasing procedure is followed, *the tool releases with less than ¼ turn at the tool!*

There are many other advantages. Get the full story by sending for booklet at lower left.

Get The Complete Story on this important Shaffer advancement by sending for this 8 page descriptive booklet. It contains cutaway views of the tool showing the oil-sealed construction and explaining how the tool operates without depending upon friction for tripping . . . gives application details for the tool . . . full dimensions of the various tool sizes, together with exploded views of parts, etc.

Or see our nearest Shaffer representative for details.

SHAFFER

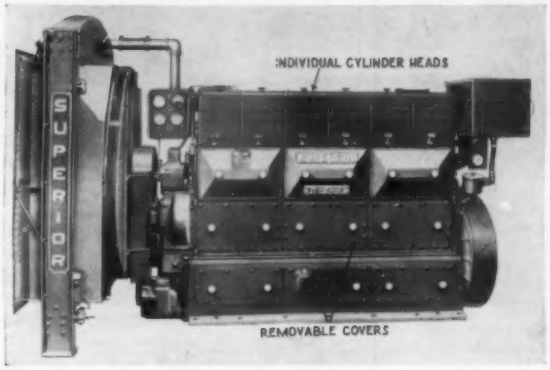
HIGH PRESSURE DRILLING AND CONTROL EQUIPMENT • FISHING TOOLS THAT EXCEL

SHAFFER TOOL WORKS, Brea, California • California Service Shops; Santa Fe Springs and Taft
HOUSTON, TEXAS, 6006 Navigation Blvd. • ODESSA, TEXAS, 1925 West Second Street
OKLAHOMA CITY, OKLAHOMA, Shaffer Tool Works, Post Office Box 546
FARMINGTON, NEW MEXICO, Shaffer Tool Works, Post Office Box 1788
CASPER, WYOMING, Shaffer Tool Works, Post Office Box 827
HOUMA, LOUISIANA, Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.
EXPORT SALES OFFICE: Shaffer Tool Works, 500 Fifth Avenue, New York, N. Y., U.S.A.

36 years OF OIL TOOL LEADERSHIP

▶ ▶ ▶ New Equipment Section

This week's SHOWCASE features . . .



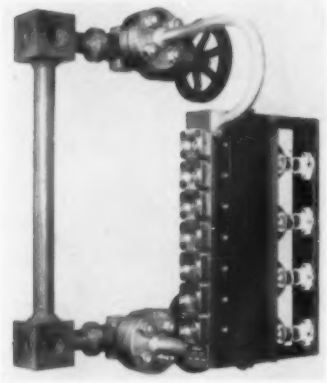
Diesel drilling engine saves space

. . . while providing a capacity of 450 to 550 hp. The Model PTDS-6M engine requires only 120 in. along the base—including space for the radiator.

Design features include an open-chamber type of combustion system that mechanically permits space for a wide valve overlap with the piston at the top of the stroke. This allows a blast of cooling air to flow through the entire chamber, cooling the upper cylinder walls, piston crown, injector tip, exhaust valve, and seat.

Provided with individual fuel pumps and injectors for each cylinder, the engine has a counterweighted and statically and dynamically balanced crankshaft with a rigid box type of base that fully supports the crankshaft.

The cylinder block is designed to simplify servicing. Engine inspections, maintenance, repairs, and when necessary, complete overhaul can be made right on the rig. Internal parts are readily accessible from both sides of the block through the large openings with removable covers. **Contact Manufacturer: White Diesel Engine Div., White Motor Co., Springfield, Ohio, for Bulletin 118.**



Color-port water-level gage

. . . is now available for boilers operating at pressures up to 1,050 psi. working steam pressure. The gage is similar to the high-pressure Yarway gage, but redesigned specifically for boiler applications in the medium-pressure field.

The gage is an individual-port type. The cover-plate assemblies can be serviced or replaced in a few minutes with the gage in place. A spring-loading system keeps proper pressure on the sealing gasket. All port assemblies are interchangeable.

The gage gives brilliant two-color readings. Steam shows red; water green. A full gage is all green, and an empty gage is all red.

Ranges of visibility are 13, 15½, and 18 in. The illuminators give the greatest intensity of light in the middle of each port. **Contact Manufacturer: Yarnall-Waring Co., Chestnut Hill, Philadelphia 18, for Bulletin WG-1815.**

●

Glass filter for particle removal

. . . in the range from 4 mμ to 200 μ size is now being produced in sizes from 1 through 2 in. Models come in in-line, angle, back-flush, and combination types. The mounting flanges are designed to meet ASME Standards.

Maximum working pressure for the maker's standard models is 50 psig. Temperature of the fluid can range from —65° to 450° F. Maximum pressure differential is 15 psig.

Instrument bodies are molded from Pyrex glass. One application of the filter in processing is to use it to sample contamination by shunting the main-line flow. The transparent housing permits visual inspection of contaminants. **Contact Manufacturer: Pyro-Flo, Inc., 416 North Glendale Avenue, Glendale, Calif., for details on glass filters.**

Send this **Showcase Coupon**

to the **Manufacturer** of the item in which you are interested. See name, address, and equipment name and/or model, in bold-face type at end of description.

NAME AND/OR MODEL NUMBER.....

.....

Described in OIL AND GAS **JOURNAL** - Issue of **April 20, 1959**

NAME.....TITLE.....

COMPANY.....

ADDRESS.....

CITY.....STATE.....

TIME TESTED
MACCO
GAS LIFT

MACCO "SPRING" FLUID OPERATED VALVE

("No Charge" Bellows)

CM2-FS

In this type valve, with no bellows charge, the spring tension is set as the valve opening pressure. The bellows functions only as a diaphragm, and the spring functions as the total actuating force. When once a valve opening pressure is set by spring tension, the pressure remains unchanged regardless of hydrostatic pressure or temperature applied to the valve in the well. Since the spring in this valve is the total actuating force, the valve may be set with either extremely low or high opening pressure (100-3000 psi). On the "SPRING" fluid operated valve, the spring tension keeps the valve closed until a desired predetermined head of fluid has entered the tubing.

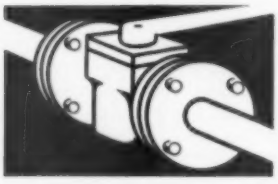
Macco "Spring" Fluid Operated Valves are manufactured in two sizes. The CM2-FS Valve is 1½" diameter for all normal installations. The CM-1Fs Valve is 1" diameter and has wide application in dual, macaroni, and slim-hole lifting.

For further information regarding lifting with Macco Fluid Operated Valves, write for Brochure No. 3-12.

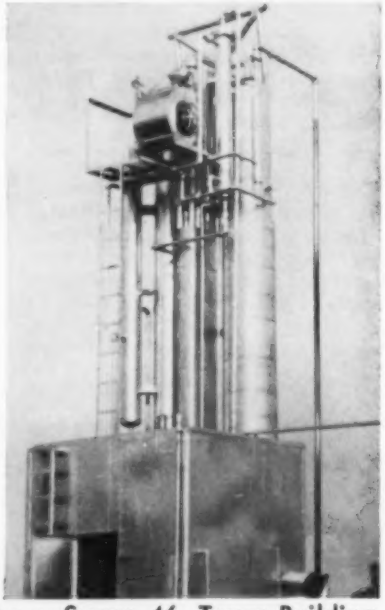
MACCO OIL TOOL COMPANY, INC.

1521 Prince P. O. Box 7288 Houston 8, Texas
Phone UN 1-1253

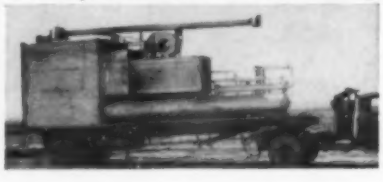
well shut in because gas is sour?



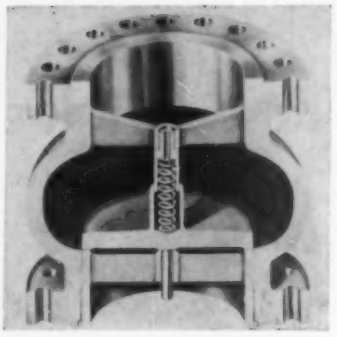
Automatic portable treaters are immediately available for rent, lease or outright purchase.



See our exhibit Tulsa Oil Show Space 46, Texas Building



Portable Treaters INC.
P. O. Box 3627 • Odessa, Texas • FEderal 7-6013
Gas Desulfurizers and Dehydrators



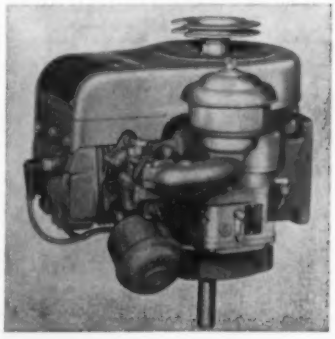
Spring-actuated valve

. . . closes automatically and quietly as soon as fluid flow stops. The stainless-steel valve disk is center-guided above and below, thus assuring a balanced lift which reduces wear and permits quick, positive seating.

The valve, which can be installed in any position, provides a large flow area (in excess of pipe diameter), to reduce fluid velocity across the seat face and lessen head loss. The stainless-steel spring is engineered to close the valve at the instant forward flow stops. This eliminates reverse flow with accompanying shock or slam.

The CPV Silent steel check valve is available in two types, ranging in size from 2 to 12-in. diameters with pressure ratings from 150 to 2,500 psi. **Contact Manufacturer: Combination Pump Valve Co., Dept. 165, 851 Preston Street, Philadelphia 4, for Bulletin 110.**

•



Vertical-shaft engine

. . . is designed for compact, low-silhouette applications. Features include tapered roller main bearings; forged aluminum connecting rod; counterbalanced, heat-treated drop-forged crankshaft; removable aluminum cylinder head; and replaceable valve-stem guides.

A vane-type oil pump furnishes spray in the crankcase to lubricate internal engine parts. Ignition is supplied by a dust and weather-sealed outside-mounted high-tension magneto

FREFLO*— a mixture of oil-soluble chemicals designed to remove water blocks in oil and gas wells — by reducing surface tension, attacking interfacial tension and breaking emulsions. 10-gallon drum contains enough for 1000 gallons of treating solution. Available at Dowell stations.

CORBAN*— a complete line of polar-type inhibitors to combat corrosion in oil and gas wells. Available in a number of formulas and concentrations, in both liquid and stick form. Corban is supplied in 10, 20 and 50-gallon drums and in bulk lots at Dowell stations.

MUDBAN*— a non-acid, mud-dispersing agent for removing filter cake from the face of formations, for removing mud lost in formations, and for freeing stuck drill pipe. Recommended for clean-up treatments. Sold in 10-gallon steel drums at Dowell stations

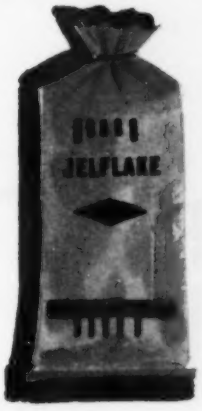
GYPBAN*— a complex phosphate sequestering agent for prolonged protection from production-restricting gyp accumulations— in the formation and on well equipment. Non-toxic and oil-insoluble. Available at Dowell stations in 50-pound fiber cartons.

DOWELL

family of products for the oil fields

The Dowell label is your assurance of a quality product. For detailed information and prompt service, call any of the 165 Dowell stations and offices. In Canada, call Dowell of Canada, Ltd.; in Venezuela, contact United Oilwell Service. Dowell, Tulsa 1, Oklahoma.

*Dowell Trademark



JELFLAKE*— a fragmented, plastic foil added to drilling muds or cement slurries to prevent or stop lost circulation. Particles vary in size for more effectiveness. Packed in strong, wet-proof bags. Available at major mud distributors and Dowell stations.

BULK INHIBITED HYDROCHLORIC ACID — has many uses, including: cleaning scale and gyp from producing formations, tubing and lead lines; cleaning scale from piping, engine jackets, heat exchangers, valves and fittings; dump-job treatments in old wells. Supplied in bulk lots at Dowell stations.

POLYDRIL*— an organic, water-soluble polymer used in clear water drilling for rapid settling of solids. It has increased drilling rates and bit life, and lowered mud costs. Supplied in a semi-liquid, easy-to-use state. Polydril is available at Dowell stations in 5-gallon cans.

PARAFFIN SOLVENT — a non-chlorinated, concentrated, oil-soluble chemical solution designed to dissolve paraffin, even when complicated by asphalt, salt, sand, gum, or wax. Packed in easy-to-handle 10-gallon steel drums. Sold at Dowell stations and major supply stores.

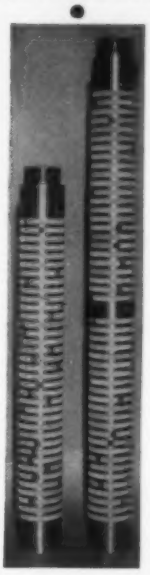
with an impulse coupling. The coupling produces a strong spark which aids in starting at low cranking speed. A mechanical flyball governor, that requires no oiling or adjusting, is built into the motor.

The carburetor is an industrial type with semiautomatic choke. The motor also contains an oil-bath air cleaner and a cooling system which is supplied by a fan cast in the flywheel, forcing air around the cylinder and head to provide cooling at temperatures up to 140° F. **Contact Manufacturer: Wisconsin Motor Corp., 5249 West Burnham Street, Milwaukee 1, for details on Models HACN and HBKN motors.**

Ductile iron pipe will twist or bend

. . . without breaking. The metal combines the corrosion resistance of cast iron with mechanical properties similar to those of steel. Applications include high-pressure pump piping, underground gas and water-service mains, well casing and tubing, ocean-going tanker-cargo piping, industrial-process piping, piping for high temperature requirements, enveloping tubes for deep-well pumps, stator shells for electric motors, piston heads for hydraulic assemblies, and machine - component parts. **Contact Manufacturer: American Cast Iron Pipe Co., P. O. Box 2603, Birmingham 2, Ala., for details on ductile iron.**

●



Pump plunger comes in new lengths

. . . and threadings. The Martin plunger is available in lengths of 1½ and 2 ft. Plungers can be screwed together to make additional shoulder-to-shoulder lengths.

The plungers have an API cage pin on top and an API F42 cage box on the bottom. The maker recommends that 1 ft. of plunger length be used for each 1,000 ft. of well depth.

Accessory equipment available for the plungers includes pull-tube bushings, box and pin-cup extensions, and box and pin repair or extension bushings. **Contact Manufacturer: John N. Martin, Mfgr., 9 West Brady Street, Tulsa, for details on 1½ and 2-ft. plungers.**

●

Two model kits for piping design

. . . are now available. One includes about 200 items such as pipe and fittings and valves in nine sizes and four colors. The other includes structural components such as crossarms, beams, footers, columns, and vessels.

Components of the piping kit are made of injection-molded polysterene and matched for push-fit assembly. Sizes range from ⅛ to ¾ in. They include not only pipe and fittings but also a variety of valves such as gate,

FIRST
IN OIL
IN THE OIL CAPITAL

Since the days
of the beaver hat,
First of Tulsa
has served
the oil industry
in its activities
the world over.
Here's the experience
and know-how . . .
in both finance and oil
. . . you want
from your bank.
Look to First National.

Think . . . 1st of Tulsa

THE FIRST NATIONAL
BANK AND TRUST COMPANY

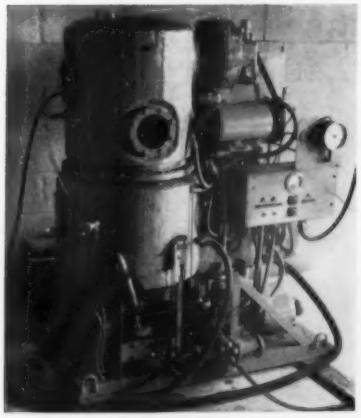
MEMBER FEDERAL DEPOSIT INSURANCE CORPORATION

New Equipment

plug, check, gear-operated, and control valves.

The structural components are made of styrene and the vessels of styrofoam. The kits may be used many times. And they offer a way to eliminate a number of plans and elevations before an approved scheme is obtained. **Contact Manufacturer: Industrial Models, Inc., 2311 Sconset Road, Wilmington 3, Del., for details on model kits.**

•



Thermocompression seawater distilling unit

. . . is designed for offshore rigs. The Meco unit is designed to provide high efficiency in conversion of sea water to fresh water. Continuous efficiency of conversion is over 300 lb. of fresh water per pound of fuel.

Two sizes of the unit are presently available—500 and 10,000 gal. per day. The 500-gal. per day unit is available only for electric operation. But the larger Model PD10000A unit is obtainable with diesel-engine power or for complete electrical operation.

This larger unit is a complete, self-contained seawater plant. A 30-hp. diesel engine will operate it. A low-speed centrifugal blower is used to circulate the steam.

During operation of the plant, temperatures are kept so low that corrosion is negligible. According to the maker, the unit is nonscaling. Thus distilled-water output is constant as well as energy requirements. Acid costs are eliminated. **Contact Manufacturer: Mechanical Equipment Co., 861 Carondelet Street, New Orleans 12, for details on new water distilling unit.**

Full-time, low-cost "BABY-SITTER" with finest references!

Penn Safety Controls will "baby-sit" your costly engines 24 hours a day with complete safety! Even in the best of engines overheated cooling water or oil pressure failure can develop. When it does, Penn Controls automatically warn you of the trouble or stop the engine, whichever you prefer. Learn more about this low-cost protection for new or old engines. Write for full information.

PENN CONTROLS, INC. Goshen, Indiana
EXPORT DIVISION: 27 E. 38th ST., NEW YORK, N.Y.

AUTOMATIC CONTROLS FOR HEATING, REFRIGERATION, AIR CONDITIONING, APPLIANCES, PUMPS, AIR COMPRESSORS, ENGINES

Near the line's western terminus, at an altitude of 2700 ft, crews are shown actually laying pipe down into a cloud bank.

There was rough terrain along the entire route of the Leidy Line. Grades of 40 pct and more were frequently encountered.

Contractor for Spread A, 65.53 mi, was Sharman, Allen, Gay & Taylor, Inc.; contractor for Spreads B (45.98 mi) and C (52.33 mi) was Panama-Williams Corp.

Working above the clouds on Transco's high-test line

There's some mighty rugged country in Pennsylvania, none of it tougher for pipe laying than along the route of Transco's Leidy Line. There, in the northern and eastern sections of the state, the Appalachian Mountains thrust their sharp ridges high above the valleys. For crews laying 24-in. Bethlehem line pipe, this meant working on severe grades, frequently up to 40 pct, and at altitudes ranging from 900 to 2700 ft. There's hardly a level stretch on the entire 164-mile length of the line. In addition, there are numerous crossings of rivers, streams, highways, and railroad rights-of-way.

Completed in December, the Leidy Line connects Transco's main line (McAllen, Texas, to New York City) with a newly developed storage field near Renovo, Pa. There, worked-out gas wells provide underground storage capacity. This functions as a "bank" where Transco customers can deposit gas during slack periods for withdrawal to supply peak load requirements.

All of the API pipe laid from the Delaware River to the storage field was supplied by Bethlehem from our Steelton, Pa., fabricated pipe shop.

Line Pipe to 42 in. OD. At Steelton we are equipped to produce API pipe, hydraulically expanded, in all diameters from 18 in. to 42 in. OD, the latter with walls to ¾ in. Electric resistance-weld pipe from 5½-in. to 16-in. OD, and continuous buttweld pipe from ½-in. to 4-in., nominal, are produced to standard API line pipe specifications on our Sparrows Point, Md., pipe mills.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

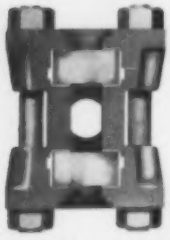
BETHLEHEM STEEL

BETHLEHEM STEEL

Strahman

HIGH PRESSURE GAUGES

USED IN
REFINERIES
AND
CHEMICAL PLANTS
THROUGHOUT THE WORLD



THRU VISION

REFLEX
Single or Multiple Sections

TUBULAR

Gauge Cocks
•
Large Chamber Reflex Gauges
•
Heated or Cooled Gauges

SEND FOR
COMPLETE CATALOGUE

STRAHMAN VALVES, Inc.
16 Hudson St., New York 13, U.S.A.

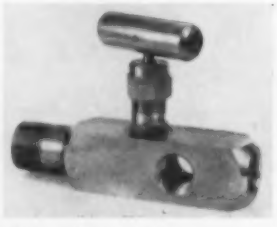
Compact two-stage air compressor

. . . is now being produced with ratings from 1 to 3 hp. for a maximum working pressure of 200 psi. Deliveries range from 5.1 c.f.m. for the 1-hp. model up to 12.25 c.f.m. for the 3-hp. model.

Design features of the Challenger compressors include a totally enclosed crankcase with a spring-loaded crankshaft seal, totally enclosed centrifugal unloader for loadless starting, copper-finned intercooler mounted directly in the stream of the fan-blade flywheel, multiple V-belt drive, and a short-stroke design. Bore and stroke range from 3¼ to 1¾ by 2⅛ for the 1-hp. size to 3¾ by 2 by 2⅛ for the 3-hp. size.

In a recent test, the compressor delivered 5 c.f.m. at 175 psi. at 1.613 hp. and 672 r.p.m. During an endurance test, the compressor operated continuously at 175 psi. for 6 weeks. **Contact Manufacturer: Champion Pneumatic Machinery Co., 825 North Pleasant Street, Princeton, Ill., for details on Challenger compressors.**

•



Single-unit gage-manifold valve

. . . was designed to replace all conventional fittings and piping used to mount a gage and gage valve with one compact barstock assembly. A double male-inlet connection provides a safe method of connecting the valve to the process coupling, the maker reports. Triple female outlets make provision for mounting the gage, gage bleedoff, drain, and sam-

Plan Your New York Visit Now

See · Learn · Compare

what's new
in the petroleum
and petrochemical
industries

•

275 Fact-Filled Displays

•

100 Informative Technical Sessions at the Congress

•

Contact and Exchange of Ideas with thousands of world's ranking oil men

•

Free Admission to this Important Exposition

In the U.S.A. for the First Time

A Panorama of New Ideas That Can Be Put to Work For You!

All Under One Roof. New York's massive air-conditioned Coliseum is ideally equipped to comfortably accommodate this world-wide event.

To help *you* meet today's needs and prepare for tomorrow's problems, more than 275 major companies from this country and abroad will present the latest materials and equipment, improved and entirely new processes, the most modern techniques, plus nuclear energy applications for use in the petroleum and petrochemical industries.

It's an important opportunity for you to learn the latest developments affecting your industry, to stimulate fresh, new ideas, and benefit from the exchange of information with thousands of the world's leading oil executives, engineers and scientists.

Plan now to attend...and bring your key men with you. Just one idea picked up here will make their visit worthwhile. For advance registration and hotel information write the Exposition at 480 Lexington Avenue, New York 17, N. Y.

5th

WORLD PETROLEUM CONGRESS EXPOSITION

New York Coliseum June 1-5, 1959

Management: International Exposition Co.

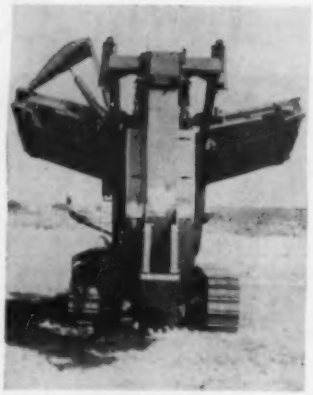
pling connection. Or they may be used for other pressure-pickup points.

The gage valve incorporated into the unit is a rising-plug type with replaceable Kel-F seat insert, Teflon stem packing, and straight-through flow passage for rodding out. Inlet connection may be either ½ or ¾-in. NPT, and the outlets either ½ or ¼-in. female NPT. The entire unit is machined from stainless steel barstock and is rated at 5,000 psig. at 250° F. **Contact Manufacturer: Anderson, Greenwood, & Co., 1400 North Rice Avenue, Bellaire, Tex., for details on Model M5 valve.**

Trencher conveyor

. . . promises high spoil discharge and reduced tumbling and rolling of spoil as compared with older types. The conveyor on the Model 240 trencher is V-shaped and designed to give a constant elevating angle. It is power-shifted left or right and power-folded.

The controls for hydraulic shifting, positioning, and folding of the conveyor are located at the operator's seat. Without leaving the seat, an operator can power shift and power position the conveyor fast and easily.

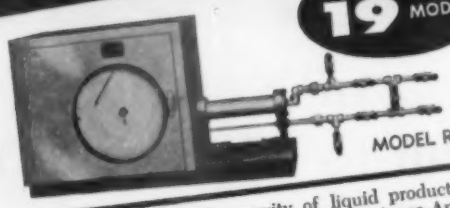


The conveyor measures 12 by 2½ ft. The trencher can dig down to 6 ft. 3 in. deep and up to 3 ft. wide. Overall width of the trencher is 8 ft. This allows it to be transported without special highway permits. **Contact Manufacturer: Cleveland Trencher Co., 20100 St. Clair Avenue, Cleveland 17, for details on Model 240 trencher.**

ARCCO

ARCCO ANUBIS
LIQUID GRAVITOMETER
FOR PIPELINES, REFINERIES, GASOLINE PLANTS

NOW 19 MODELS



Wherever the specific gravity of liquid products or processing fluids is an important factor Arcco-Anubis Liquid Gravitometers will render accurate recordings of continuous flow and spot checks of samples under varying conditions of temperature and pressure. Foreign liquids and gases are automatically purged. Changes in the specific gravity of the sample are recorded almost instantly. High pressure and high viscosity liquids are handled with ease. Charts graduated for specific gravity are available in over 100 ranges. Charts for Degrees A.P.I. are available in over 30 different ranges. Arcco Liquid Gravitometers are made for recording, controlling, indicating, transmitting and various combinations of these functions. Special charts when required can be furnished at slight additional cost.

AD NO. 104

AMERICAN
RECORDING CHART COMPANY
7142 East Condor Street, Los Angeles 22, California

Send for Bulletin No. 111-R3

Send for Bulletin 111-R-3

Level control uses ultrasonics

. . . to detect levels in storage tanks. Liquisonic control is operated by ultrasonic waves transmitted and received by ceramic-glazed transducers. These crystal transducers are mounted at the ends of two Teflon probes on the detector head.

When a liquid, slurry, or granular solid intervenes between the probes, they cause the signal strength to change which actuates a snap-acting control.

This control can be wired to actuate a pump, valve, or failure warning.

Accuracy of the control is 0.01 in. It is unaffected by gases, vapors, temperature change, shock, or vibration, impervious to corrosives, and explosionproof. **Contact Manufacturer: Custom Controls Mfg. Co., 220 East Fifth Street, Odessa, Tex., for details on Liquisonic level control.**

SHOWCASE . . .

New Literature

Level-detection and control system

. . . device known as Level-Tek is described in a new illustrated brochure now obtainable. The device indicates and controls a predetermined level in liquids, granular solids, or solids of a bulky and massive nature, according to the brochure. An electronically actuated relay operates built-in signal lamps and a snapswitch. The signal lamps indicate whether the material level is above or below the desired point. The four-page publication notes that the snapswitch is used to operate remote warning devices or motor starters, valves, or timing devices which may be used to maintain the desired levels. The instrument has no moving parts within the bin or vessel. **Contact Manufacturer: Aeronautical & Instrument Div., Robertshaw-Fulton Controls Co., 401 North Manchester Boulevard, Anaheim, Calif., for Level-Tek brochure.**

Triplex-plunger pump

. . . Model J-125 is outlined in new six-page Folder 499, which gives design features, performance data, and specifications. The publication includes two performance charts: one for low, medium, and high-pressure models—the other for plungers. Specifications cover six fluid ends for service with corrosive and noncorrosive liquids under varying pressure requirements. **Contact Manufacturer: National Supply Co., Two Gateway Center, Pittsburgh 22, for Folder 499.**

Trench drills will handle augers

. . . of up to 6-ft. lengths and 24-in. diameters, as detailed in new six-page Folder TD-159. The drills operate from a trench and drill horizontal holes beneath the surface. Holes are bored and pipe is pushed at the same time. The folder gives complete operating specifications, dimensions, and recommended uses. **Contact Manufacturer: Salem Tool Co., 700 South Ellsworth Street, Salem, Ohio, for Folder TD-159.**

Heat-transfer products

. . . are discussed in four-page Bulletin 581. Products are broken down into the following categories: (1) hairpin heat exchangers; (2) fired indirect heaters; (3) tank heaters for bulk-storage tanks; (4) process heat-

Few organizations can compare with Houston Contracting's experience over all types of terrain. From marshland to mountain, across river or plain this experience can mean the difference between completion and *completion ahead of schedule.*

HOUSTON CONTRACTING COMPANY

Laurence H. Favrot
R. P. Gregory
H. J. Muckley
Geo. A. Peterkin

2807 BUFFALO SPEEDWAY
HOUSTON 6, TEXAS

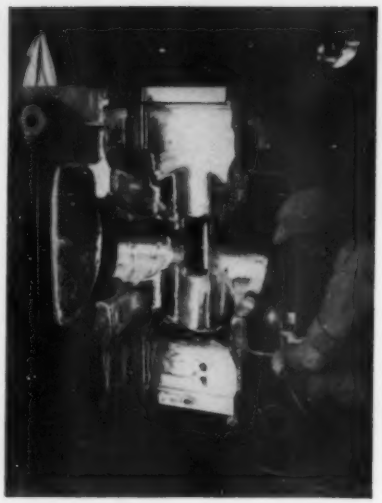
OIL • GAS • PRODUCTS • WATER PIPELINES

. . . were especially designed and developed for angled firing vertically in all types of radiating wall furnaces-heaters . . . They are not an improvization.

AIROCOOL MULTIPORT INCLINED GAS BURNERS HAVE:

- **Nozzles that can be machined to direct the flame impact at 15°, or any other desired angle to produce the highest degree of heat transfer by radiation from the incandescent reflecting wall. They produce a short flame.**
- **An accurate secondary air adjustment to allow close limits of any excess air and thus result in the highest fuel efficiency.**
- **Higher B.T.U. capacity and greater turn down ratio, with only scant furnace draft and with a minimum of secondary air.**
- **Unique design features that enables them to burn high Hydrogen gas without "flash back".**
- **A reduced size and weight of refractory burner block of inexpensive design.**
- **Means for easily and quickly withdrawing or inserting the gas burner, and requiring only a minimum of labor to accomplish it.**
- **A low maintenance factor including that of the nozzle which is heat protected on its upper surface.**

National Airoil
BURNER COMPANY, INC.
Main Office & Factory: **1236 EAST SEDGLEY AVE., PHILADELPHIA 34, PA.**
SOUTHWESTERN DIVISION: 2512 SOUTH BOULEVARD, HOUSTON 6, TEXAS



QUALITY CONTROL AND PRESSURE CONTROL

In the picture above, a skilled Cameron die-maker is hand polishing half of a die set which will be used for forging a Cameron Type "F" Blowout Preventer body.

Why do we make our own dies for our own specially designed forging presses? Why do we make our own steel? Isn't this carrying things a bit too far? We don't think so. When a Cameron pressure control for drilling or producing leaves one of our plants we want to know that it will do everything expected of it – in Alaska, South America, Sumatra or anywhere experienced operators drill for oil. Our objective has always been pressure controls which are the finest of their kind. But the best in design requires the best in manufacture for safe, economical performance. So we leave no stone unturned. Quality control from the drafting board to the delivery dock is the reason you can COUNT ON CAMERON no matter where you drill or produce.

Cameron
IRON WORKS, Inc.
P. O. Box 1212 – Houston, Texas
Export Office: 7912 Empire State Bldg., New York City. In England: Cameron Iron Works Ltd., 76 Grosvenor St., London W. 1 England

ers and coolers for bulk heating of gas or liquid material; (5) packaged boilers with 60 and 100 hp. ratings; and (6) custom-built equipment. The bulletin adds descriptions of heat-transfer tubes and product illustrations. **Contact Manufacturer: Brown Fintube Co., 508 Huron Street, Elyria, Ohio, for Bulletin 581.**

Punched-card data processing

. . . specially designed for small business is described in a new six-page folder. A new system makes it possible for small companies, or branches and plants of larger ones, to machine process such accounting work as production control, payroll, inventory control, accounts receivable, and sales analysis. The system consists of four basic pieces of equipment: (1) alphabetical punch; (2) sorter; (3) alphabetical tabulator and summary punch; and (4) reproduction punch. The system operates at a speed of 60 cards-per-minute and can be adjusted to perform faster. Additional units can be added as desired. **Contact Manufacturer: Remington Rand Univac Div., Sperry Rand Corp., 315 Fourth Avenue, New York City 10, for Folder U1638.**

65-page ethylene-amines book

. . . provides comprehensive coverage of ethylene-amine chemistry. Ethylene-amine intermediates have applications as asphalt additives, reagents in production and refining, and as lubricating oil and gasoline additives. They have also been effective as corrosion inhibitors for oil and gas wells. The book contains ethylene amine properties, reactions, uses, and handling and storage. **Contact Manufacturer: Organic Chemical Intermediate Sales. The Dow Chemical Co., Midland, Michigan, for Ethylene Amines book.**

Better Products for Automation

. . . Through Standardization, is the title of a booklet prepared from lectures and discussions conducted at engineering conferences and seminars. It outlines the adaptability of standardized precision gears and components to a wide variety of design requirements. The 32-page pocket-size publication includes such subject matter as pin hubs, clamp-type and hubless gears, worm and wheel drives, tooth-to-tooth error, burrs, pitch ranges, and backlash. All material is accompanied by illustrations, engineering drawings, and

Leland "Packaged Unit" makes tough jobs easy on Texas-Florida Gas Line

On the 2600-mile gas line now under construction between McAllen, Texas and Miami, Florida, Leland "Packaged Units" are doing a workhorse job. On-the-road or off-the-road, towing or winching, the proven "Packaged Unit" gives operators dependable performance plus five important extras . . .

- **Headache Rack** — tough, hydraulic tubing for complete protection
- **Gin Pole Pocket** — one piece steel casting for single or double setting
- **Body Deck Plate** — flush mounted, 2" center-matched hardwood and tempered steel
- **Winch Mounts** — for safety & strength with or without winch
- **Rolling Tail Pipe** — seamless hydraulic tubing on shielded ball bearings

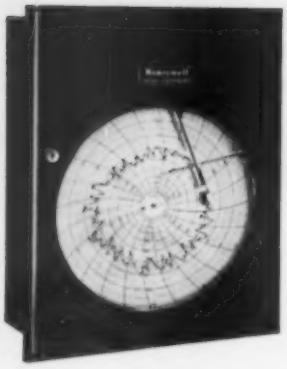
The workhorse line of Leland truck bodies is your best bet for heavy duty trucking. Investigate the advantages of Leland's "Packaged Unit" . . . Fifth Wheel Body . . . Pole Trailers . . . and Self-Loading Floats.

Call Leland for fast parts delivery and service on truck and construction equipment. Parts and service are available on such leading lines as Thew-Lorain . . . Gardner-Denver . . . C-M-C . . . Blaw Knox . . . Cedarapids . . . Cleveland Trenchers . . . Tulsa Winches.

Leland
EQUIPMENT COMPANY
Oklahoma City • TULSA • Longview, Texas

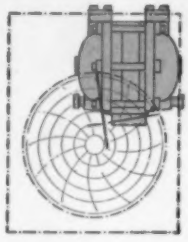
Honeywell Bellows Flow Meter

HERE ARE FOUR OF MANY WAYS YOU CAN USE THE BELLOWS FLOW METER



For direct measurement and control

the meter is integrally mounted on indicators, indicating controllers, recorders, or recording controllers.

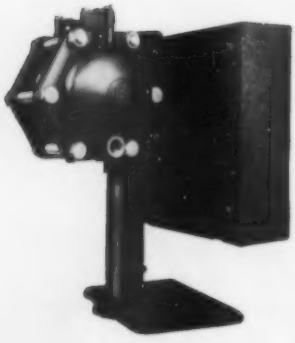


With an indicator or recorder—Indicators can be supplied with or without pneumatic transmission. Recorders can be one, two or three-pen instruments, with the second and third pens actuated by thermometer and/or pressure elements.

With indicating or recording controllers—All indicators and recorders can be supplied with any pneumatic control form from on-off to three-mode. Indicating controllers are also available with pneumatic transmission.

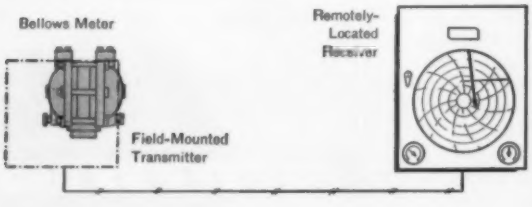
With a "blind" transmitter—the non-indicating differential pressure transmitter is used when indication is not required at the process and the variable is to be transmitted to remotely located instruments.

With an indicating transmitter—Scale is graduated in accordance with the flow or liquid level span of the transmitter. These transmitters are available with pneumatic control to remotely operate final control elements.



For remote measurement and control

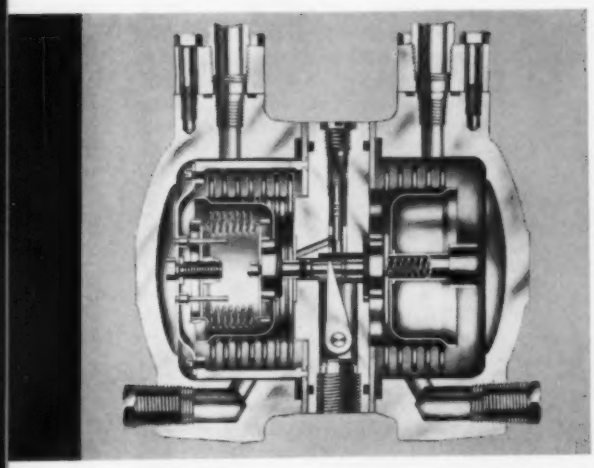
Field-mounted transmitters, either "blind" or indicating, can be used with remotely located indicators, recorders, and controllers.



and with Tel-O-Set miniature instruments and a variety of options!

has applications unlimited

Unequaled for accuracy, stability, versatility in flow and liquid level metering



Transfer of liquid between opposing high and low-pressure bellows converts differential pressure measurement into motion. A torque tube assembly carries the motion outside the meter body to an instrument. Therefore, changes in differential pressure change the instrument reading.

Here's the most advanced meter body available today, with advantages never before found in flow and liquid level meters. Combine the new Honeywell Bellows Flow Meter with the instruments shown on the facing page for truly superior service in metering steam, water, gas, oil and other fluids.

Some of its outstanding features:

Sensitive and accurate—Sensitive to within 0.5% of full scale . . . calibrated accuracy ±0.5% of full scale.

Leakproof—Between liquid fill and process fluid.

Automatically stabilized—Changes in meter body temperature or static pressure have no effect on output shaft position. Meter operates efficiently in ambient temperatures of minus 40°F to plus 250°F.

Unmatched convenience features—Including fast range changing in the field . . . connections for both horizontal and vertical piping . . . quick calibration and adjustment . . . easy cleaning and servicing.

High corrosion resistance—Seamless, stainless steel formed bellows give long, trouble-free service with virtually all process fluids.

Fast, effective damping adjustment—New type ° pulsation check with rectangular orifice permits essentially linear damping adjustment . . . and adjustment from outside the meter body during operation.

Models are available in many ranges, for both flow and liquid level measurement and control. Get details on *all* the features of the new Honeywell Bellows Flow Meter by calling your nearby Honeywell field engineer today . . . he's as near as your phone.

MINNEAPOLIS-HONEYWELL, Wayne and Windrim Avenues, Philadelphia 44, Pa.

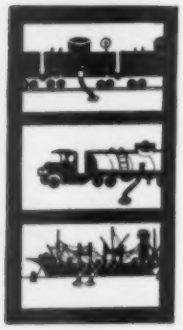
● **REFERENCE DATA: Catalog C22-1**

Honeywell

First in Control

FUELING MADE EASY

with ROYLYN "Non-Spill" COUPLING VALVE



From tank car to tank ... from tank to truck or ship ... from tank to tank ... this "quick" coupling-valve simplifies loading, filling or transfer of petroleum, petro-chemicals and other fluids.

- ELIMINATE LOSS OF FLUID
- MINIMIZE FACILITY CONTAMINATION
- REDUCE FIRE AND ACCIDENT HAZARDS
- LOWER MAINTENANCE COSTS
- REDUCE OVERFLOW SPILLAGE
- LOWER EQUIPMENT COSTS

Write Today for Free Literature

The Best Connections in the World

AIRATERRA

620 PAULA AVENUE • GLENDALE 1, CALIFORNIA

data tables. **Contact: PIC Design Corp,. 477 Atlantic Avenue, East Rockaway, Long Island, N. Y., for Better Products for Automation Through Standardization booklet.**

Flow-control technical brochure

. . . details new concepts with descriptive text and drawings in 20 pages. The bound loose-leaf type publication includes equipment lists, a flow-actuated control chart based on gallons-per-minute and valve size, and drawings of a flow-actuated control unit mounted on a check valve. **Contact Manufacturer: Flow-Actuated Control Co., Inc., 101 West Palisade Avenue, Englewood, N. J., for Flow Controls technical bulletin.**

Null-seeking servo-type plotter

. . . designed to draw curves in Cartesian coordinates on 8½ by 11-in. paper is described in a new bulletin. The X-Y recorder is designed for any low-frequency phenomena for which a permanent record is desired. The four-page bulletin consists of photos, descriptions, typical uses, and technical data. **Contact Manufacturer: Houston Instrument Corp., 1717 Clay Avenue, Houston 3, for X-Y Recorder bulletin.**

Fast analysis of petrochemical samples

. . . in a growing petroleum plant is described in new two-page Data Sheet GC-91-0. The literature explains the use of gas chromatographs for around-the-clock quality-control analysis in a plant which produces butadiene, ammonia, ethylene, and ethylene oxide. A case history shows how the use of the chromatographs increased analytical capacity by 400%. Problems, solutions, and comments are offered. **Contact Manufacturer: Beckman Instruments, Inc., 2500 Fullerton Road, Fullerton, Calif., for Data Sheet GC-91-0.**

Porcelain enamel on steel

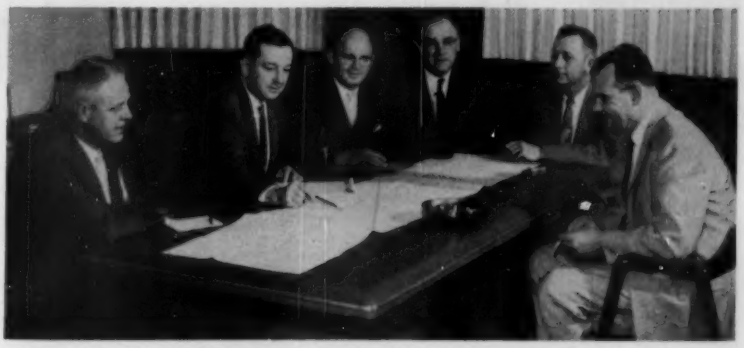
. . . offers you a building material which can be shaped to a variety of sizes to fit numerous requirements, according to a new brochure. The 12-page multicolor publication is packed with pictures and includes drawings, applications, and advantages of the material. **Contact Manufacturer: Avoncraft Div., Avondale Marine Ways, Inc., P. O. Box 1030, New Orleans 8, for Porcelain Enamel on Steel brochure.**

D. M. Jacks named vice prexy

D. M. Jacks

...and general manager of Visco Products Co., Houston. Jacks, former vice president in charge of sales, succeeds Charles F. Spangler, who was named management consultant. Until his scheduled retirement in late 1960, Spangler will assist the new Visco management team of Jacks and Dr. W. H. Kirkpatrick, vice president of research and manufacturing.

Meanwhile it was announced that Paul E. Southern will be transferred to Houston and promoted to manager of administrative services.



HALLIBURTON INTENSIFIES SALES EFFORTS—The manager and some of the staff of Halliburton's Denver division review new products and tools as part of a general sales program being presented to division personnel. Ed Trapp, Halliburton Oil Well Cementing Co.'s sales manager from the Duncan, Okla., headquarters, is conducting meetings through the Rocky Mountain area. Shown, left to right, are: W. M. Sanderson, credit manager; Joe Maly, division manager; Felix Moody, assistant division manager; J. W. Hall, customer contact; John Banister, division engineer; and R. N. Killman, assistant credit manager. All are stationed at Denver.

J&L Supply Division makes

...two changes in its sales management group, according to W. L. Wolfe, vice president in charge of sales.

Jack Judd

C. E. Bogle

Jack Judd, manager of the drilling-equipment section; general-products sales, was promoted to assistant manager of general-products sales. He will operate from the Houston office. W. O. Hardy is manager of sales; general products, in Tulsa.

C. E. Bogle manager of the wire-rope section; general-products sales, takes over Judd's section in Tulsa.

Judd started with Jones & Laughlin as city sales-machinery representative in Tulsa 7 years ago. He was promoted to manager of the drilling-equipment section in 1956.

Bogel joined J&L Steel Corp. as a salesman for the wire-rope division in 1950. Three years later he was transferred in the same capacity to Denver. Bogel became manager of the wire-rope section at Tulsa in 1957.

BJ Service opens new Tulsa

...headquarters for the company's Mid-Continent Division, announces John B. Merritt, president and general manager of the Borg-Warner subsidiary.

B. L. (Bill) Crone, Mid-Continent Division manager, will locate in the Tulsa office, where he will supervise the 16 Mid-Continent stations and offices. Crone, a 9-year company veteran, has had extensive experience in oil-well servicing in the area.

Hyde, McCaskill are promoted

...by Magnet Cove Barium Corp., announces Frank Loe, vice president

R. B. Hyde, Jr.

J. N. McCaskill

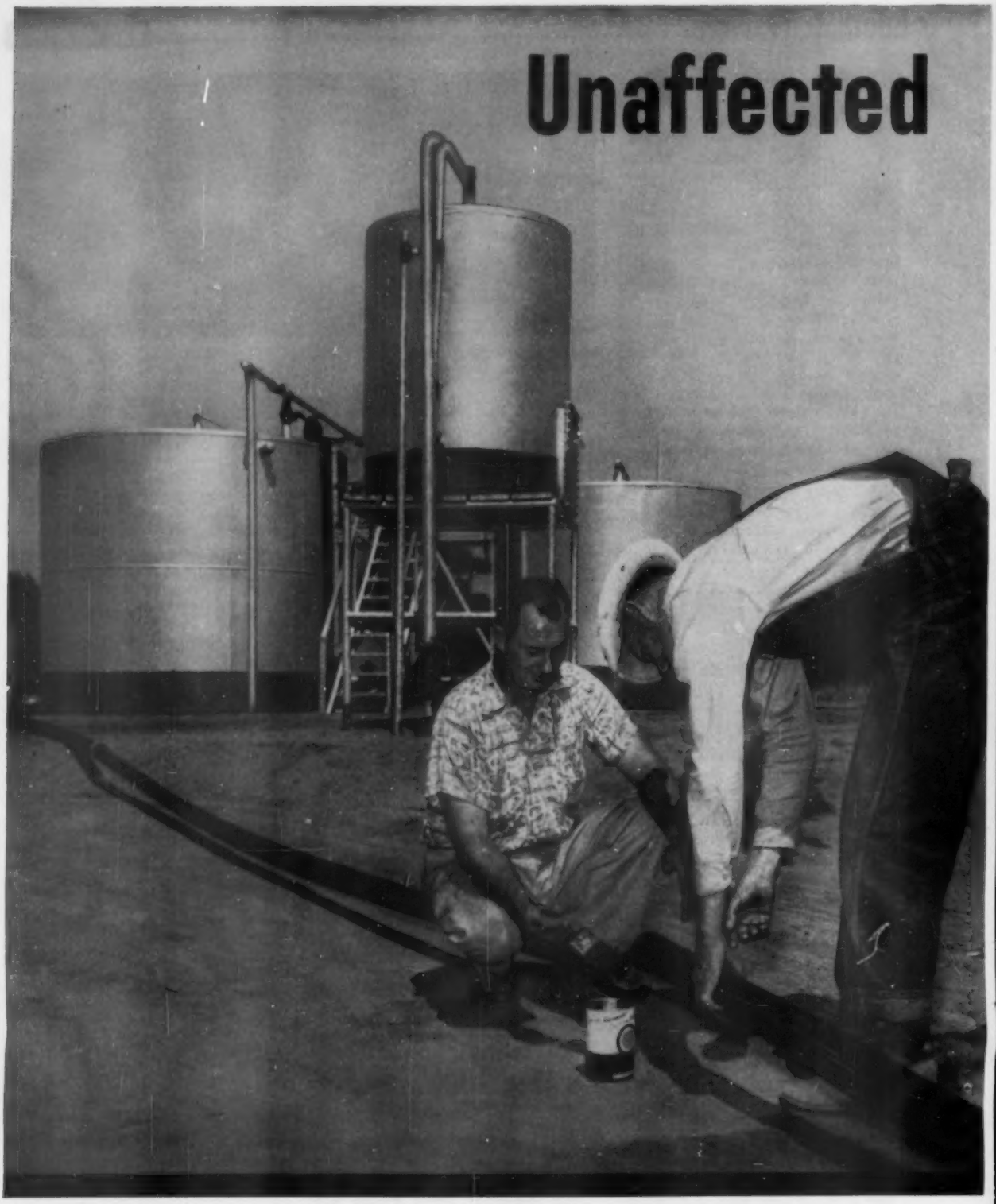
and assistant manager of the company's marketing division.

R. B. (Buddy) Hyde, Jr., was promoted from chief service engineer of the drilling-mud department to the newly created post of export sales manager of the foreign operations department. James N. McCaskill, a member of Magcobar's staff service engineering group for the past 2 years, succeeds Hyde as chief service engineer. Both men will continue to locate at Houston.

Hyde joined the company as a sales

Members of Petroleum Engineers' Association of Mexico tour

...Houston oil-equipment manufacturing facilities as guests of Mission Mfg. Co. Group members made an inspection of the Mission plant and company products. Standing, left to right, are: Gabriel O. Saavedra, associated with G. Saavedra e Hijos, S. de R.L.; Eduardo Barreda, Enrique Herrera V., Ted Fullinwider, Mission domestic sales manager; Salvador Sanchez M., Enrique Bracamontes, Gustavo E. Saavedra, Mission sales representative in Mexico who heads G. Saavedra e Hijos; Rodolfo Dominguez C., Carlos Cuellar, Jesus Chavarria, Mario Brondo Ruiz, Francisco J. Munoz, Miller Sparks, Mission director of public relations; Charles Neuhause, and Miguel Martinez Rios. In the front row are Juan Garcia, Anselmo Cabello, Raul Lopez G., Angel Castrejon N., Armando Castellanos, and Jose del Carmen Cu Mance.



PERMANENT JOINTS CAN BE MADE IN SECONDS . . . when the pipe is Republic SRK. And, above-ground lines can be moved about easily as needs change. Ordinary handsaw is all that is required for fast, accurate cutting. Brush-applied solvent and plastic fittings "weld" joints in a fraction of the time required by conventional lines.

by Crude, Brine, or Soil...

REPUBLIC SRK PLASTIC PIPE

First-cost is last cost! Republic SRK Plastic Pipe is unaffected by crude oil, brine, or raw gas. It is inert to the most severe acid or alkaline soil, immune to electrolytic action. Yet despite these replacement savings, SRK costs no more to buy than ordinary pipe.

Installation savings bring first-cost down even more. With SRK, economical brush-applied solvent and plastic fittings permit any type of joint to be made in seconds. Pipe is lightweight and easy to handle. Cuts with ordinary handsaw. And, it can be installed in combination with existing pipe lines.

Produced by the steel pioneer in plastic tubular products, SRK is available in a wide range of pressure ratings and sizes from ½" through 6". Republic also makes Semi-Rigid Butyrate (SRB) for extreme paraffin conditions. Both types are characterized by low friction loss as well as exceptional uniformity and toughness. Both types can weather rough handling without damage.

Learn more about pipe that costs no more to buy –far less to install—virtually nothing to keep in service. For complete information and specifications on Republic SRK and SRB, mail the coupon today.

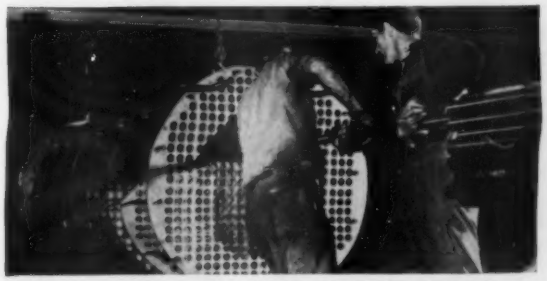
REPUBLIC STEEL
CLEVELAND 1, OHIO

World's Widest Range of Standard Steels and Steel Products

REPUBLIC CAN ALSO HELP YOU...

MEET EXTREME ABRASION AND IMPACT REQUIREMENTS with Republic Alloy Steels. Their greater strength and toughness, plus superior abrasion, impact, and corrosion-resistance permit use of smaller, lighter cross sections. Result is fully safe, dependable equipment, of minimum weight and bulk. Applications include tongs, bits, blocks, elevators, draw-works parts. Send for data.

MEET EXTREME FASTENING REQUIREMENTS with Nylok® Bolts and Nuts. Secure lock is produced by nylon pellet imbedded in body of fastener as shown (top nut). In use, pellet is deformed, setting up a permanent lateral thrust. As a result, opposite threads produce a strong, metal-to-metal lock, whether or not fastener is seated. Nylok Fasteners are fully adjustable and re-usable. Mail coupon for details.



MEET EXTREME PERFORMANCE SPECIFICATIONS with ELECTRUNITE carbon or stainless steel Heat Exchanger Tubes. ELECTRUNITE is formed from highest quality flat-rolled open-hearth or electric furnace steel and welded by Republic's exclusive ELECTRUNITE process that unites the tube without the addition of foreign metal. FARROWTEST®, a proved production safeguard that detects and rejects tubing with defects of critical size, is offered as an alternate to other less positive tests . . . at no extra cost. Mail coupon.

REPUBLIC STEEL CORPORATION
DEPT. OG-7547
1441 REPUBLIC BUILDING • CLEVELAND 1, OHIO

Please send more information on:

- ☐ SRK and SRB Plastic Pipe
- ☐ Republic Alloy Steels
- ☐ ELECTRUNITE® Heat Exchanger Tubes
- ☐ Nylok Bolts and Nuts

Name_____ Title_____

Firm_____

Address_____

City_____ Zone____ State_____

DOW | **HERBICIDES**

GARLON . . . *new combination chemical*

knocks out weeds and grasses, costs less than cutting

For getting rid of unwanted vegetation, Garlon* is the one right formulation. It's brand new—and unique—from the research labs of Dow. It contains a special combination of powerful herbicides that control both broad-leaved weeds and grasses. It is a systemic killer—destroys roots and all. And Garlon is easy to use. It mixes readily with water, and seven gallons of Garlon properly diluted with water will effectively treat a full acre of land. Professional contractors like its handling ease—and your own maintenance men can apply Garlon and obtain good results.

Some gas and oil companies are still using mowers and man hours to get rid of nuisance weeds and grass around tank farms, pipe lines, storage and equipment areas. But cutting is more expensive and far less satisfactory than spraying with Garlon. Cost comparison figures show that savings are substantial when you switch from cutting to spraying. For more information on chemical control of vegetation and/or the name of a qualified professional contractor near you, send the coupon below to THE DOW CHEMICAL COMPANY, Midland, Mich., Agricultural Chemical Sales Dept. 207DC-4-20

*TRADEMARK OF THE DOW CHEMICAL COMPANY

The Dow Chemical Company
Agricultural Chemical Sales Dept. 207DC-4-20
Midland, Michigan

☐ Please send me additional information about Garlon and modern vegetation control chemicals.

☐ Please send me the name of a qualified professional contractor in this area.

NAME_____
TITLE_____
COMPANY_____
ADDRESS_____
CITY_____ STATE_____

THE DOW CHEMICAL COMPANY, MIDLAND, MICHIGAN

and service engineer in 1949. Before serving as chief service engineer in 1955, Hyde was a mud engineer in South Louisiana and district manager at Vernal, Utah, and Oklahoma City.

McCaskill joined Magcobar as a sales and service engineer in 1951. He was a mud engineer in Oklahoma, Florida, Alabama, and Mississippi, and instructor of the company's engineer-training lab at Houston before being named to the staff service engineering group in 1957.

Jim Rea named district manager

Jim Rea

...for American Iron & Machine Works Co., reports W. R. (Bert) Wheeler, Jr., vice president in charge of sales of the Oklahoma City firm. Rea will headquarter in New Orleans. Before his promotion, Rea was a special representative for American Iron in Tulsa. He was transferred to Tulsa from Great Bend, Kans., where he had been sales representative for the western half of the state.

Production men make plant tours during API technology course

The group toured Harbison-Fischer Mfg. Co.'s plant in Fort Worth and Otis Engineering Corp.'s Dallas plant in connection with a 6-week refresher course in petroleum technology, sponsored by API, the University of Texas, and Kilgore, (Tex.) College. Similar groups have visited the same facilities during previous school courses.

Marley Co. makes three

...staff changes.

Leon T. Mart, who founded the Kansas City company and has been president during the 37 years of its operation, has been elected chairman of the board of directors.

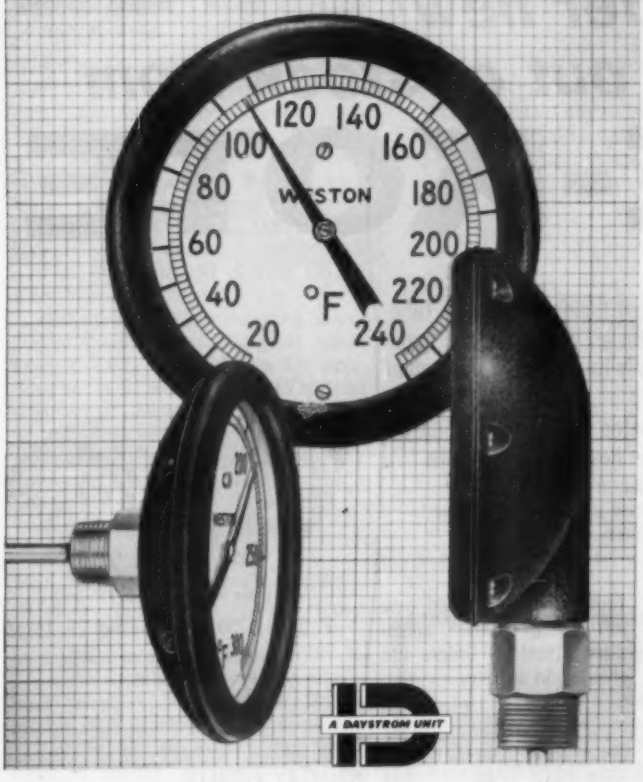
J. A. Cameron, Jr., succeeds Mart as company president. For the past 6 years, Cameron has been executive vice president. Prior to that, he was vice president and western district sales director. The new president has been with Marley for 22 years.

L. T. Mart

J. A. Cameron

M. A. Patton, head of research and development, was advanced to vice president in charge of those oper-

WESTON THERMOMETERS: STANDARDS OF STABILITY IN SCIENCE AND INDUSTRY



WESTON HEAVY-DUTY BIMETALS:

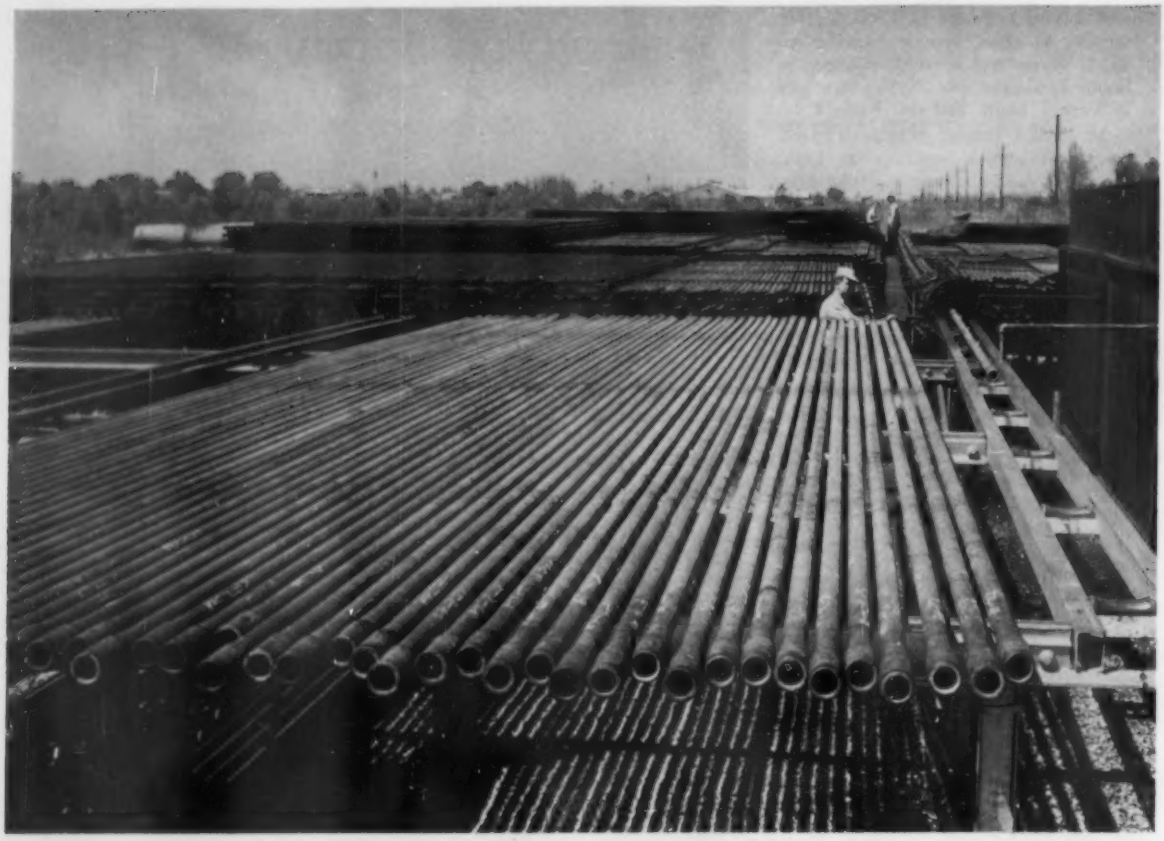
Proved under industry's most punishing conditions:

Wherever thermometry is critical or unusually demanding you can specify *Weston* with confidence. You have at your disposal a full line of the most rugged, stable, sensitive instruments ever designed for strenuous service.

Weston Heavy-Duty Bimetal Thermometers offer exceptionally reliable sensitive elements...corrosion-proof, pressure-tested stainless steel stems and connection nuts . . . abuse-proof forged brass heads . . . unusually large, readable scales. Accuracies within 1% of full scale range are assured. 20 standard ranges are available—covering an area from −100° to 1000° F. or −100° to 400° C. Standard stem lengths from 2½" to 72"; scale lengths of 9" and 12".

Catalog 09-100 contains full information. Contact your local Weston representative, or write to Weston Instruments, Division of Daystrom, Inc., Newark 12, N. J. *In Canada: Daystrom Ltd., 840 Caledonia Rd., Toronto 10, Ont. Export: Daystrom Int'l., 100 Empire St., Newark 12, N. J.*

WESTON Instruments



now you can order new coated tubing out of stock from

TUBE-KOTE®

When you need new API standard tubing in a hurry, Tube-Kote has the answer. Large inventories of tubing are maintained in stock, fully coated and ready for immediate shipment from our Houston plant.

Whether you purchase new coated tubing or coating for your own tubing, you can expect the best from Tube-Kote . . . first name in corrosion resistance since 1939.

Your order for coated new API tubing receives immediate attention. Orders are shipped in a hurry.

TUBE-KOTE

Service Mark Reg. U. S. Pat. Off.

P. O. Box 20037 • Houston 25, Texas

Branch plants: Harvey, Louisiana
Midland, Texas

OUR 20TH YEAR . . . THE INDUSTRY PIONEER

ations. In his 12 years with the company, Patton has had a number of engineering - administrative positions.

M. L. McAlister is appointed

... vice president in charge of manufacturing of H. C. Smith Oil Tool Co., announces Donald E. Graham, executive vice president. McAlister has been with the company for 23 years, joining the firm when it was formed. For the past 4 years, he has been manager of manufacturing operations.

M. L. McAlister

Bank directors elect

... Lewis H. Bond president and a director of Fort Worth National Bank, and advance three bank officers to positions of greater responsibility.

James E. McKinney, chairman of the executive committee and executive vice president, was elected chairman of the executive committee and chief executive officer. Vice presidents Joe A. Clarke and W. H. Peterson were named executive vice presidents.

Lewis H. Bond

J. E. McKinney

Bond, who succeeds the late Estil Vance as president, joined the bank's oil-loan division in 1952. He formerly served as head of the proration section of Stanolind Oil & Gas Co. in Fort Worth.

McKinney began his banking career in 1919 with Durant National Bank, Durant, Okla. He resigned his position as vice president in 1926 and later joined First National Bank of St. Louis as assistant vice president. He joined Fort Worth National Bank as a vice president in 1933 and was elected to the board of directors in 1947.

Van Waters & Rogers, Inc., gets

... the exclusive right to market two models of Consolidated Electrodynamics Corp.'s moisture monitors in 11 western states and part of southwest Texas, reports Robert L. Smallman, CEC's marketing vice president.

Van Waters & Rogers, headquartered in Seattle, will market the in-

HENRY H. PARIS DISTRIBUTOR, Inc.

OIL WELL, REFINERY AND INDUSTRIAL SUPPLIES

1125 ROTHWELL ST • P. O. BOX 932 • HOUSTON, TEXAS

Agent and Distributor for the Following Nationally Known Manufacturers:

ALTEN FOUNDRY & MACHINE WORKS
Lancaster, Ohio
Surface Equipment.

MILLS IRON WORKS, INC.
Los Angeles, Calif.
Seamless Swage Nipples, Bull Plugs & Welding Reducers.

DRESSER MANUFACTURING DIV.
Bradford, Pa.
Seamless Welding Fittings, Couplings and Sleeves.

OIL STATES EQUIPMENT COMPANY
Houston, Texas
OSECO Silvertop Fusible Plugs with renewable inserts for all types OIL COUNTRY BOILERS.

THE FAIRBANKS COMPANY
Binghamton, N. Y.
Bronze and Iron Valves.

STEEL FORGINGS, INC.
Shreveport, La.
Weld Saddles.

THE GORMAN RUPP COMPANY
Mansfield, Ohio
Centrifugal Pumps.

VOLCANO BURNER COMPANY
Houston, Texas
Volcano Superior and Gulf States All Steel Gas Burners for OIL COUNTRY BOILERS.

HARRISBURG STEEL COMPANY
Harrisburg, Pennsylvania
Forged Steel Flanges and Seamless Casing Couplings.

WESTERN SAFETY BARREL STAND
Houston, Texas
Stand lifts, holds, tilts 55 gal. barrels Prevents spillage—easily loaded.

LOS ANGELES BOILER WORKS, INC.
Los Angeles, Calif.
Welding Caps—Dished & Flanged Heads.

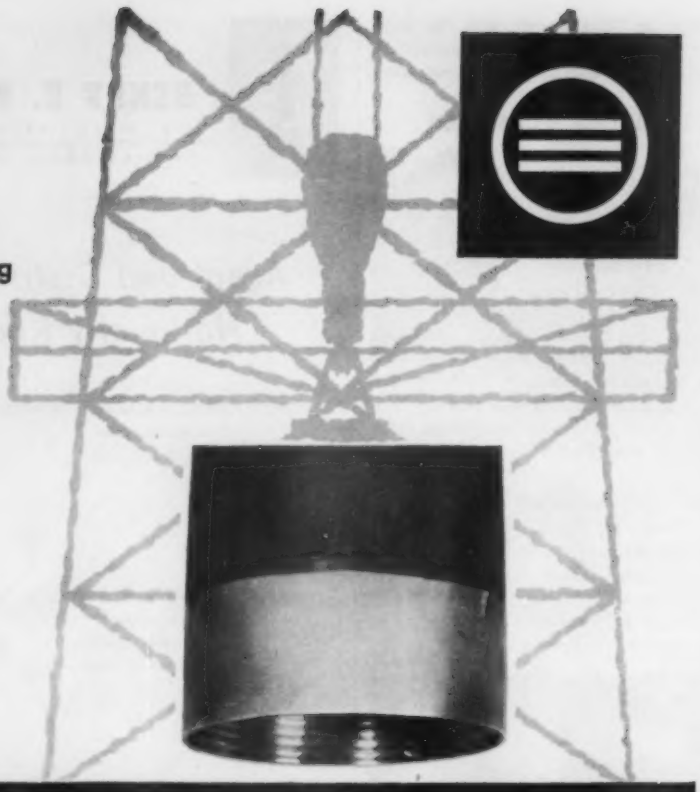
WHEELING MACHINE PRODUCTS CO.
Wheeling, West Virginia
XL Steel Pipe Couplings for OIL COUNTRY TUBULAR PRODUCTS.

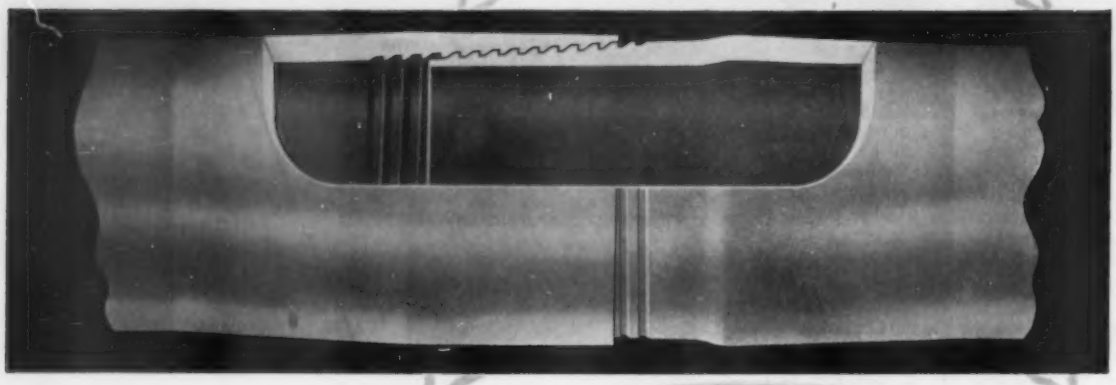
SEE YOU AT THE OIL SHOW
Booths 20, 21, & 22
California Building.

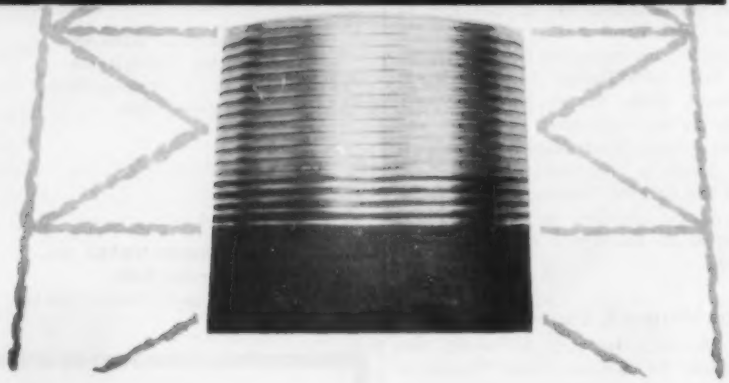
Omega Joints for Casing and Tubing

- Smaller borehole diameter
- Quicker assembly
- Faster casing off

Our tests have proved:
No weak spots in casing and tubing lines with Omega joints.







Please ask for our Prospectus No. 0597

Our technical staff will be glad to advise you.

PHOENIX-RHEINROHR AG
VEREINIGTE HÜTTEN- UND RÖHRENWERKE DÜSSELDORF
GERMANY

struments through three divisions—Braun Chemical Co., Braun-Knecht-Heimann Co., and Scientific Supplies Co.

Field-engineering office opened

. . . by Thompson-Ramo-Wooldridge Products Co. in Port Arthur, Tex., reports Raymond E. Jacobson, director of marketing.

The office was established to make computer-systems maintenance, operational liaison, and other services more readily available to customers in the Port Arthur area. Eugene C. Swanson has been placed in charge of the office.

Fluor Corp., Ltd., appoints

. . . David S. Tappan, vice president in charge of domestic sales; George H. Dieter, vice president in charge of foreign sales; and James P. Kneubuhl, vice president in charge of utility sales.

D. S. Tappan

G. H. Dieter

Tappan joined Fluor in 1952 as administrative assistant to the vice president in charge of sales. Dieter has been with Fluor 19 years, starting as a sales engineer. Kneubuhl started with the firm in 1941.

Unit Rig & Equipment Co. names

. . . C. F. Southward, general sales manager, and W. J. Peycke, works manager, reports J. L. Vint, Jr., president.

C. F. Southward

W. J. Peycke

Southward, who will direct all sales and service functions, joined the concern in 1945. He was formerly West Texas district manager and administrative manager of the Tulsa sales department.

Peycke, formerly acting works manager, joined Unit Rig in 1953. He has served as project engineer and plant superintendent.

C. M. Mayhew elected a director

. . . of Gardner-Denver Co. at its annual meeting held recently in Quincy, Ill. Mayhew is vice president of Mayhew Machine and Mayhew Supply of Dallas, companies which joined Gardner-Denver in December 1958. The new director succeeds the late Howell W. Murray.

C. M. Mayhew

Reelected at the meeting were Ralph G. Gardner, chairman; Arthur D. Chilgren, E. Vincent Erickson, Benjamin C. Essig, John W. Gardner, Arthur E. Johnson, Gifford V. Leece, Alexander G. Lindquist, and Bernath P. Sherwood, Jr.

26-story skyscraper to serve

. . . as headquarters for Phoenix-Rheinrohr A.G., steel and pipe producers located in Duesseldorf, West Germany. The building will be the tallest in the German community and will be ready for occupancy this year, reports a Phoenix-Rheinrohr representative in New York City.

The modern office building, whose costs amount to nearly $8 million, will house more than 1,200 employes.

BUSINESS and PLEASURE in TULSA means-

THE MAYO
world-famous HOTEL
Completely AIR-CONDITIONED
600 ROOMS
ADJACENT GARAGE

PURIFIER CHALK TALK #12

ΔP_s { operating load / max allowable load through given size } Δp at given oper. pressure

PROBLEM...
HOW TO SIZE A GAS SCRUBBER
SOLUTION...
USE HI-EF SELECTION CHARTS

To determine the size purifier, scrubber, separator or mist extractor for a given application, *mathematically*, requires intricate calculation work. Now with Anderson's handy selection charts your job is done in seconds. These charts enable you to choose units for even the most difficult applications in minutes. Send for your set. Saves time. Sizes correctly. Circle the reader service card.

SEE OUR AD IN REFINERY CATALOG

THE V. D. ANDERSON COMPANY
division of International Basic Economy Corporation
1977 West 96th Street • Cleveland 2, Ohio

PURIFIERS . . . SEPARATORS . . . SCRUBBERS

ANDERSON Hi-eF PURIFIERS

CONTINENTAL-EMSCO STORES & OFFICES

CANADA

ALBERTA
Calgary
Drayton Valley
Edmonton
Red Deer

BRITISH COLUMBIA
Fort St. John

MANITOBA
Virden

SASKATCHEWAN
Estevan

ENGLAND
London*

VENEZUELA
Anaco
Caracas*
Las Morochas
Maracaibo

UNITED STATES

ALABAMA
Citronelle

ARKANSAS
El Dorado
Magnolia

CALIFORNIA
COASTAL REGION
Ventura
LOS ANGELES BASIN
Long Beach
Los Angeles*
Santa Fe Springs
SAN JOAQUIN VALLEY
Bakersfield
Coalinga
Taft

KANSAS
El Dorado
Ellinwood
Great Bend*
Liberal
Pratt
Russell
Wichita*

LOUISIANA
NORTH LOUISIANA
Jena
Shreveport
SOUTH LOUISIANA
Harvey
Houma
Lafayette
Lake Charles
Morgan City
Morgan City Parts Depot
New Orleans*
Venice

MISSISSIPPI
Laurel
Natchez

MISSOURI
Kansas City*

NEW YORK
New York City*

OHIO
Columbus*

OKLAHOMA
Ardmore*
Bartlesville*
Drumright
Duncan
Healdton
Laverne
Lindsay
Oklahoma City
Perry
Seminole
Tulsa*

TEXAS

EAST TEXAS
Carthage
Kilgore
Longview
Palestine
Tyler*
Winnsboro

NORTH and WEST CENTRAL TEXAS
Abilene
Dallas*
Fort Worth*
Graham
Nocona
Wichita Falls

SOUTH TEXAS
Alice
Freer
Luling
McAllen
San Antonio*

SOUTHWEST TEXAS
San Angelo

TEXAS GULF COAST
Corpus Christi
Daisetta
El Campo
Falfurrias
Houston
Victoria

TEXAS PANHANDLE
Amarillo*
Borger
Pampa

WEST TEXAS
Andrews
Hadacol Corners
Kermit
Lubbock*
McCamey
Midland*
Monahans
Odessa
Post
Snyder
Sundown

Rocky Mountain States

COLORADO
Artesia
Denver*
Rangely
Sterling

MONTANA
Billings*
Cut Bank
Glendive

NEBRASKA
Kimball

NEW MEXICO
Farmington
Hobbs
Tatum

NORTH DAKOTA
Williston

WYOMING
Casper
Cody
Newcastle
Rock Springs

Tri-State Area

ILLINOIS
Chicago*
Salem

INDIANA
Evansville*
New Harmony

KENTUCKY
Henderson

*Office only. No stock at these points.

Representatives and agents in all oil producing countries of the world.

Specify...

CONTINENTAL-EMSCO

FIRST STEPS TOWARD

Specify..

HI-TEN

RELIANCE

TYPE 5

HEATREAT #1 CM

CONTINENTAL-EMSCO SUCKER RODS

A rod for every well condition

If your purchasing system calls for "high tensile" rods from companies A, B and C rather than specifying exact rod grades, your rod strings are costing too much.

For example, Continental's medium-priced Type 5 rod can handle the same loads of many so called "high-tensile," higher-priced rods. Why? Because, Type 5 contains VANADIUM . . the amazing element that strengthens the rod, so it has greater load-carrying capacities than rods of similar properties *without* vanadium.

Call your C-E man. Talk over your rod requirements . . well conditions. His recommendations will reduce your pumping costs by (1) matching well conditions with the *right* rod, and (2) by giving you *higher quality* for longer service.

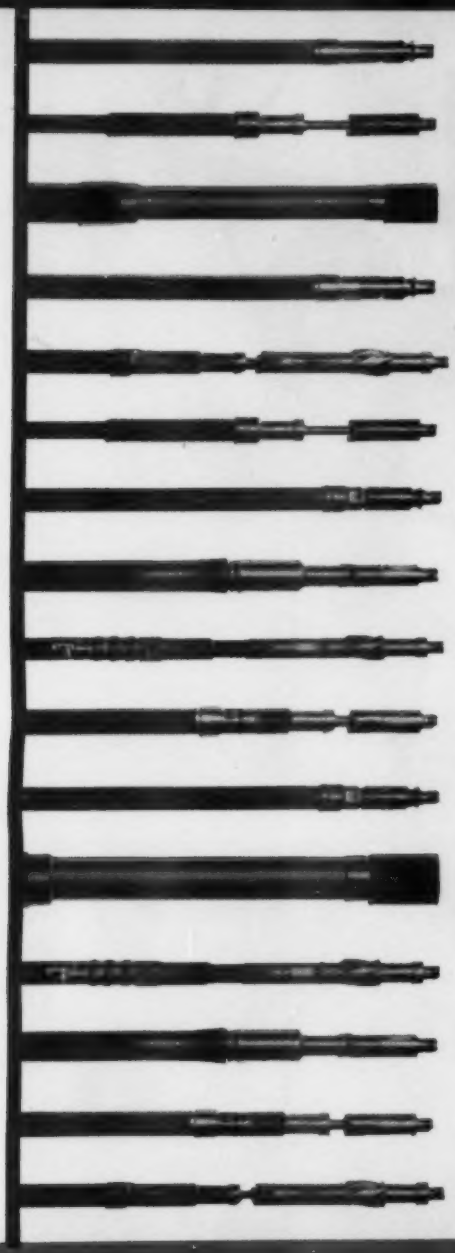
API SUCKER ROD COUPLINGS

Strengthen this vital link

All Continental sucker rod couplings are *lubrized* to protect coupling threads against corrosion and damage during make-up. These couplings are induction hardened for longer life and *100% inspected* before shipment . . to assure proper field make-up and your complete satisfaction.

for Service

D LOWER-COST PRODUCTION



Specify..

CONTINENTAL-EMSCO D+B SUBSURFACE PUMPS

Assembled just for your well

The profit squeeze is on. No longer can you afford the luxury of *standard* pump assemblies.. often with metals of poor corrosion resistance, weak intermediate parts, or misapplication of pump materials.

Now, you need to take advantage of the full *range of Continental-Emsco subsurface pumps* ..37 types with over 700 variations. There's one to pump every well, efficiently and economically, regardless of depth, type of hole or corrosive, abrasive or gaseous conditions. Talk over your pump requirements with your C-E man.

Be sure to take advantage of C-E subsurface pump repair shops.. located in producing fields everywhere.

e that Sings..

Specify THE ECONOMY PRODUCTION TEAM

..CONTINENTAL-EMSCO UNIT PUMPERS and SPECIALISTS

Your Continental-Emsco man sees that you get the *right* unit pumper for the job. He sees that it is *properly applied* with the right stroke length for maximum pump efficiency .. with the right strokes per minute to reduce rod failures and prevent excessive wearing of gears, belts and bearings.

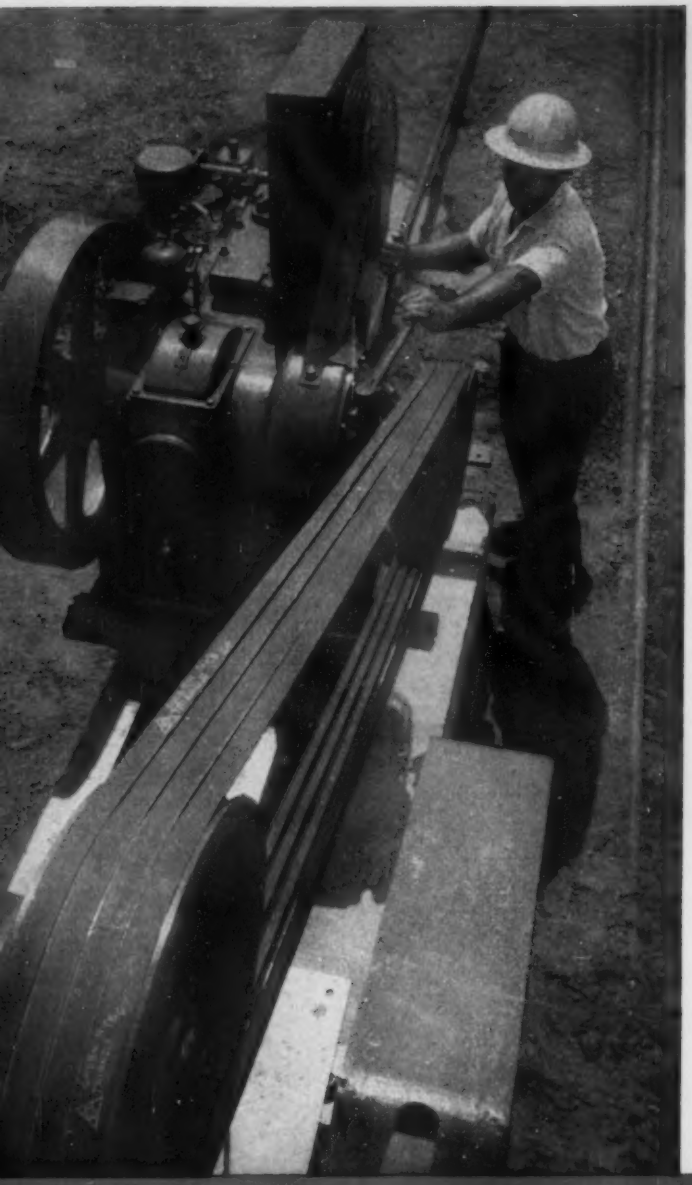
Changing well conditions are easily met by C-E safe, ground-level counterbalancing .. economically done by one man. Here again, you can count on your C-E man. He weighs your wells, when necessary, to be sure you are getting maximum lifting efficiency at the lowest possible fuel or electrical cost.

For service before, during and after installation, specify Continental-Emsco unit pumpers ..

.. Equipmen

Proper Attention Guarantees Longer Life for

GREEN TRIANGLE V-BELTS

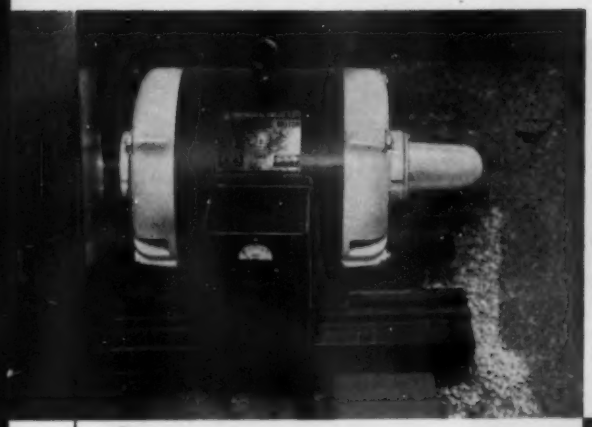


Recommendations of your C-E service man on tension, alignment and operating conditions will greatly increase belt life. His advice as to the number of belts to use assures maximum power transmission and often cuts initial costs.

Proper belt adjustment is easy with GREEN TRIANGLE V-BELTS . . sold in *matched sets.* Since each belt is identical in diameter, length, thickness, material and freshness with others in the set, adjustment for one assures uniform adjustment for all.

New York Belting and Packing Company packs Green Triangle V-belts in matched sets . . *a performance plus feature* that costs no more . . exclusively at Continental-Emsco stores.

t that Hums



Specify..

BIG ITEMS . . or small

Each Continental-Emsco store is individually stocked to meet the requirements of localized fields, so regardless of your lease location, you'll find all the items needed to do a better pumping job. Specialists are readily available to advise you on well-maintenance problems . . how to keep your production costs in line.

Specify..

C-E GREEN TRIANGLE ELECTRIC MOTORS . .

they're replacing many higher rated motors

After taking a close look, many major companies are standardizing on C-E GREEN TRIANGLE ELECTRIC PUMPING MOTORS. Here's why. They have a 40° C. rise and a *guaranteed 1.15 service factor* to handle unanticipated power demands. Their 5-8% slip and 275% starting torque reduce peak electrical loads. An exclusive *built-in* balance meter cuts well maintenance costs by making it easy to balance your wells . . see that they stay in balance. Rods and unit pumper are not vibrated apart as when pumping with an unbalanced well load.

This motor fits your pumping needs . . will cut your production costs. It's *oil field* tough . . *oil field* proven . . with Continental-Emsco *dependability* built-in.

Learn to rely upon your C-E stores for lower-cost production . . and *for equipment that hums . . service that sings.*

SEE OUR EXHIBIT

MAY 16-23, 1959
Tulsa, Oklahoma

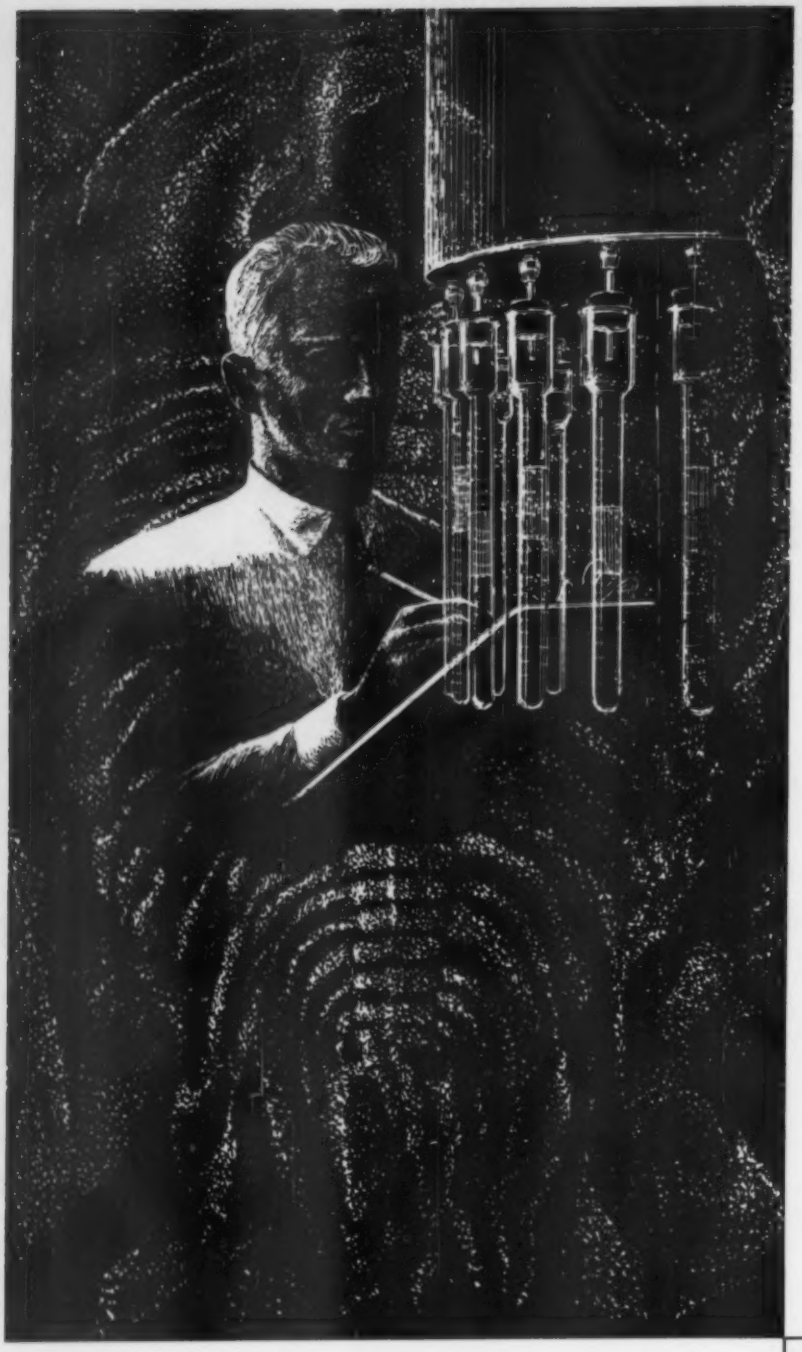
CONTINENTAL-EMSCO

Serving the Oil and Gas Industries ... Worldwide

PB24R

CONTINENTAL-EMSCO COMPANY • A Division of The Youngstown Sheet and Tube Company • General Offices: Dallas, Texas
Export Division: 30 Rockefeller Plaza, New York, N. Y. • Continental-Emsco Company Limited • General Offices: Calgary, Alberta, Canada
Continental-Emsco Company C. A., Caracas, Venezuela • Plants: Houston and Garland, Texas; St. Albans, Herts., England
Representatives in All Principal Oil Fields of the World

..Go CONTINENTAL-EMSCO



So Begins The Last Chapter

The story of oil, with all its attendant theories of origin, migration, and entrapment, can be a very absorbing subject. The mere fact that oil's "life" represents a fascinating round-trip — from surface, to deposit, and back to the surface again — is material enough for many intriguing papers.

But when you pin **X** number of dollars to the end of **X** feet of drill pipe, the subject becomes considerably less glamorous.

So begins the last chapter. Payout or play-out? What are the formation's basic productive characteristics? Where are the most effective (and safest) completion points? How susceptible is the reservoir to some type of secondary recovery process?

What field methods are best suited to maintain optimum balance between the reservoir's ability and the operator's desired income? What are the most economically feasible approaches — for development, for banking?

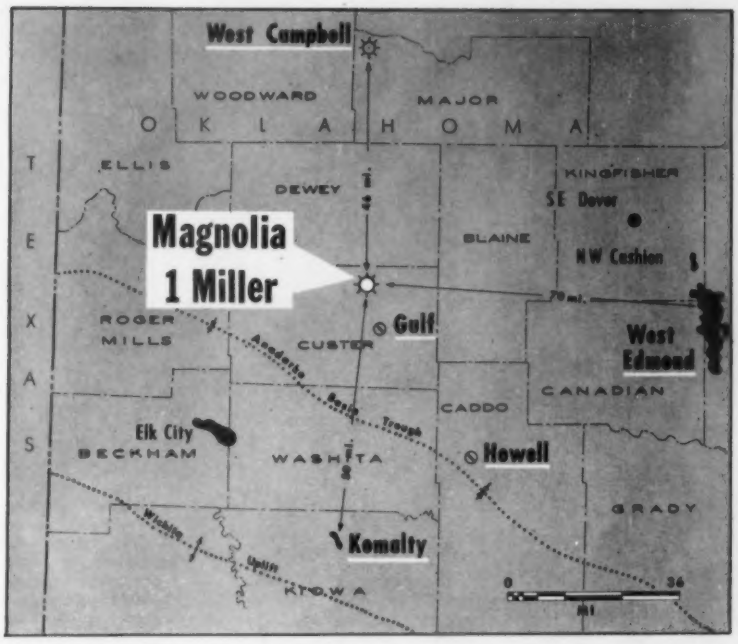
Core Lab's fully-integrated reservoir engineering services — *Well Logging, Core Analysis, Reservoir Fluid Analysis, Engineering and Consulting, and Research* — play vital roles in answering these and an endless procession of other vital questions.

Let Core Lab help you write the last chapter.

CORE LABORATORIES, INC.
801 CORE STREET DALLAS 7 TEXAS

CORE LAB

DALLAS FT WORTH HOUSTON MIDLAND ABILENE PAMPA AMARILLO MONAHANS LUBBOCK HOBBS PECOS ROSWELL CORPUS CHRISTI VICTORIA M.ALLEN SAN ANTONIO SHREVEPORT TYLER EL DORADO HATTIESBURG JACKSON TULSA OKLAHOMA CITY WICHITA FALLS BARTLESVILLE WICHITA LIBERAL LAFAYETTE NEW ORLEANS DENVER STERLING CRAIG CASPER WORLAND KIMBALL WILLISTON FARMINGTON LOS ANGELES BAKERSFIELD LONG BEACH CALGARY EDMONTON REGINA VENEZUELA S A



MOST IMPORTANT DISCOVERY in Oklahoma this year is the Magnolia 1 Miller in northeastern Custer County. It opened the first production in the county, and is the second Hunton lime discovery in the entire Anadarko basin. Its success will stimulate deep drilling throughout western Oklahoma.

Deep Hunton strike arouses wide Anadarko interest

BY FRANK J. GARDNER

OKLAHOMA has bagged a wildcat strike that will probably go into the books as that state's discovery of the year. In the process, a new county makes its debut as a producer of oil and gas, leaving only 7 of Oklahoma's 77 counties in the dry column.

Magnolia Petroleum Co. 1 Miller (Section 22-15n-16w), in northeastern Custer County, may open a new era in western Oklahoma exploration. It's the first indicator of what lies in store for oil finders in the deeper parts of the Anadarko basin. And it firmly establishes the Hunton (Siluro-Devonian) group as a major objective throughout the basin.

Add to these distinctions the fact that Magnolia 1 Miller opens the second-deepest production in Oklahoma, the second - deepest Siluro - Devonian production on this continent, and the second Hunton producer in the Anadarko basin. These "seconds," plus the impressive "firsts" associated with the well, certainly qualify it as the most significant discovery in this region since 1954, when the state's deepest field was found at Carter-Knox.

Multiple rewards . . . Magnolia has finished the 1 Miller as a 95-M.M.c.f. gasser (open-flow gage). It was carried to a total depth of 17,000 ft., 779 ft. into the Arbuckle-Ordovician. Completion was made after light acidization in two Hunton formations, the Bois d'Arc limestone at 14,383-14,472 ft. and the Chimney Hill limestone at 14,773-14,818 ft. Besides these commercial flows, small showings of oil and gas in the lower Pennsylvanian sands, in three Arbuckle zones, and in the Bromide and Simpson sands were recorded in the Miller test. These lend hope to the possibilities of multiple targets in deep Anadarko drilling.

Another encouragement to deep drilling here was the existence of 12% average porosity in the Bois d'Arc and 8% in the Chimney Hill, both rather high for limestones at these depths. As for permeability, it was described only as "good."

At a remote location . . . The only other Hunton producer in the basin lies 46 miles to the north at West Campbell field; this also is a 1959 discovery. Sinclair Oil & Gas Co. opened the field with its 1 Spafford (Section 33-23n-16w) in northwestern Major County; potential here was 5,571 M.c.f. of gas per day plus 53 bbl. of condensate from Hunton at 8,271-8,358 ft.

To the east, Hunton oil lies 60 to 70 miles away at Southwest Dover (incorrectly shown as Southeast Dover on the map), at Northwest Cashion, and at famous West Edmond field, largest Hunton producer in the world.

Some idea of the steep dips and deep burial of formations in the Anadarko trough can be had by comparing the Hunton top in Magnolia 1 Miller (about 14,350 ft.) with the estimated top in the bottom of the basin—21,500 ft. Fifty miles south of the Miller well, independent operators have had a heyday at Komalty field in recent years, completing Hunton producers at 400 to 1,000 ft. on the flanks of shallow folds bordering the Wichita uplift.

Lead to a new Hunton role . . . Magnolia plans to drill its next Custer County well about a mile north of the 1 Miller in an attempt to define the trap. The discovery location was staked on the basis of seismic and subsurface work, and the logical assumption is that the company has outlined a structural anomaly of sizable extent here. Hunton oil has nearly always been associated with stratigraphic entrapment, and no doubt this will play a role in Custer County, but we now are witnessing the emergence of the Hunton as a structural objective. So far, Southwest Dover field is the only true Hunton anticline in the area of this map: all other Hunton fields are located on the regional truncation line of the Bois d'Arc.

As of today, only one other well is active in newly productive Custer County. This is Gulf Oil Corp. 1 Burgtorf, Section 6-13n-15w, now drilling at 10,623 ft. about 10 miles southeast of the new discovery. Gulf intends to carry this one to 13,500 ft., but the success by Magnolia may alter its plans. It may alter many another plan in future.

SLOSHING through the Laguna Madre shallow mud flats are, left to right: junior surveyor, R. M. Howard; surveyor R. J. Bathelemy, and helper H. W. Lewis.

In a shallow sound off Texas' Gulf Coast . . .

Oil hunters wade to work

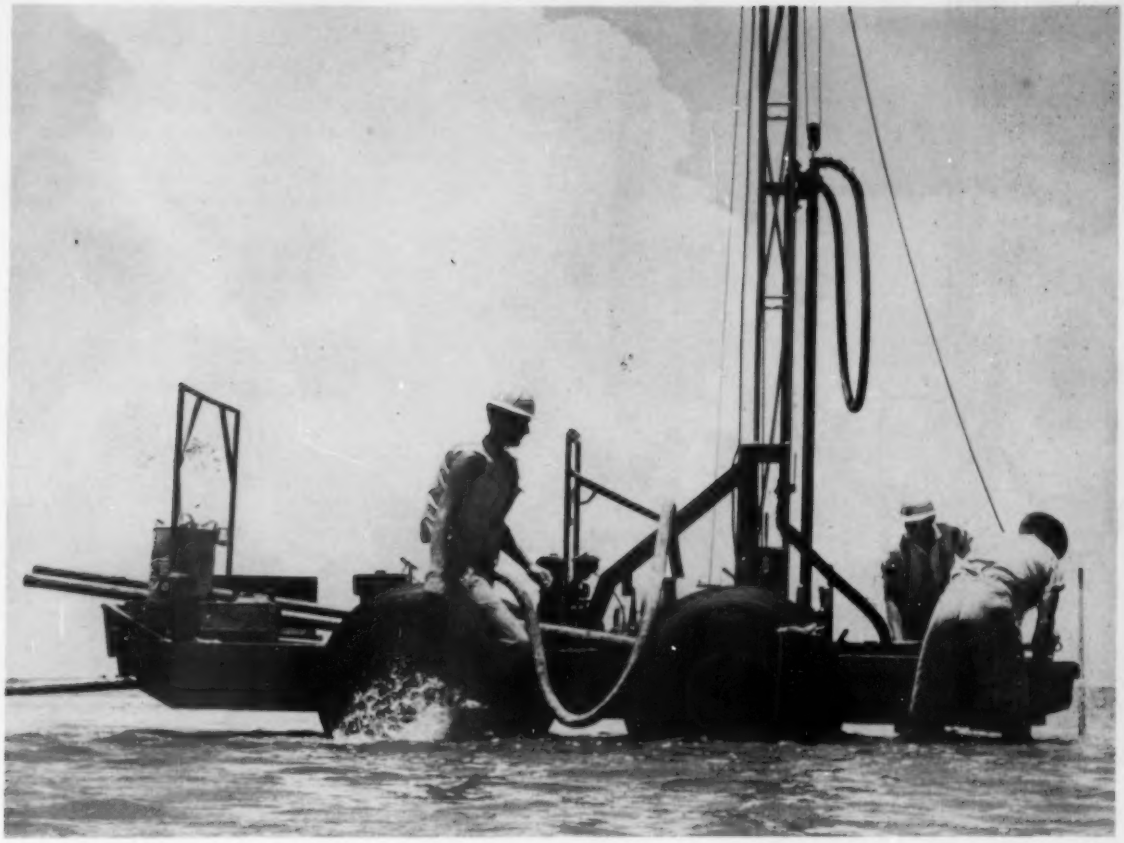
GIANT-WHEELED TRACTORS, called "David Buggies," were used by seismic party No. 11 to haul men and equipment through Laguna Madre, a shallow stretch of water, protected from the Gulf of Mexico by Padre Island, which extends from the southern tip of Texas 100 miles north to Corpus Christi, Tex. Bob Coward, left, a mechanic who works for the owners of the "David Buggies," helps W. D. Isler of Party No. 11 tow the instrument trailer.

SEISMIC CREWS are pioneers in the oil business. Information about underground structure recorded by their seismographs helps discover new oil frontiers.

Shell has more than 20 seismic crews of its own and several contract crews working in the company's continuous search for oil-bearing formations. Like pioneers of the past, they frequently are confronted with new and unusual situations. They have explored such regions as the snow-covered hills of northern Montana, the desert country of Utah, the dusty plains of West Texas, the swamps of Louisiana, the waters of the Pacific and Gulf of Mexico, and other places where the job required special equipment and plenty of ingenuity.

The pictures show Shell Seismic Party No. 11 of the Houston exploration and production area at work in Laguna Madre, a shallow sound between the mainland and 100-mile-long Padre Island in the Gulf of Mexico. It extends from Brownsville on the southern tip of Texas north to Corpus Christi, Tex.

Taken from Shell News.



THE DRILLING RIG is mounted on trailers equipped with large underinflated aircraft tires. Here, the drill crew, wading in knee-deep water, gets set to drill a shot hole. Members of the crew are, left to right, helper W. S. Allen, E. P. Baldwin, assistant driller, and J. L. Langlois, driller.

GEOPHONES or "jugs" are pushed into the mud floor of Laguna Madre until they strike solid ground. In the photo at right, R. E. Himojosa, a jug hustler, bends over to plant one of the instruments.

SHOOTER P. Delcambre gets word from the seismograph operator via radiotelephone to set off the dynamite in the shot hole.

SOUND WAVES from the explosion are picked up by the geophones and recorded on the seismograph. Isler, in foreground, watches the mud and water geyser caused by the explosion.

A SEISMOGRAM, developed in the trailer-mounted instrument hut, is examined by seismic operator F. Smith, left, division geophysicist A. B. Wood, and party chief P. E. Deatherage.

Work of this type was new to many of the men in Party No. 11. The equipment they used was new to all of them — specially designed tractors and trailers equipped with giant wheels and tires. In the past, Shell crews working in Laguna Madre used a combination of tractors, air-propeller boats, and house boats to do the job. The new tractors, called "David Buggies," are more flexible and cost less to operate.

The tractors, which rolled along the soft mud floor of Laguna Madre on metal drum-like wheels or fat rubber-cleated tires, were leased from Applied Research Development Co. of Houston. The large surface area of their wheels prevented them—most of the time—from sinking into the mire. They were used to pull the seismic crew's equipment (the drilling rig, instrument hut, powder magazine, and water tank) which was mounted on metal trailers fitted with large underinflated aircraft tires.

Aside from the muddy water and strange-looking equipment, seismic operations on Laguna Madre are much the same as they are on dry land. First, the survey team stakes locations for the drilling crew. When the drilling crew finishes drilling a hole, the shooter moves in and loads

the hole with dynamite. At the same time, cables with geophones or "jugs" attached to them at certain intervals are stretched out and laid in a pattern. (The jug hustlers, who ordinarily must dig holes for the geophones, find it easier to plant the jugs in Laguna Madre; they just push the instruments into the ankle-deep mud). When the cable connecting the geophones is attached to the instrument hut, the seismograph operator in the hut signals the shooter to explode the dynamite.

The resulting sound waves are picked up by the geophones, changed to electrical impulses, and recorded on sensitized paper by the seismograph. The records or seismograms are later grouped to form a profile—a comprehensive pattern which shows the depths of subsurface horizons. The profiles are used to map the structure of the formations for study by geophysicists and geologists.

Party No. 11 has profiled as much as 80 miles in one month on land, but it took them 6 weeks to do 40 miles of profiling on Laguna Madre. However, with a combination of mud, water, and heavy equipment, that's still good progress.

Deep drilling set for Illinois

DEEP EXPLORATION is planned in the Illinois portion of the Illinois basin. The well will be the deepest yet for the state. Richard P. Ryan, eastern division manager for Carter Oil Co., said his firm will drill to 8,500 ft. if necessary in Fayette County's Louden - Avena pool, 12 miles east of Vandalia, Ill.

The well will be strictly a wildcat venture. The state's current deep hole is Superior 17 H. C. Ford "CW" Lease in New Harmony field, White County. That well went to 7,682 ft. back in 1952.

Carter's new try will be of utmost interest to the industry's oil hunters due to the increasing push to deeper rocks in the states east of the Mississippi River. Exact location of the new well has not yet been staked, but it will be on a 160-acre tract somewhere in Louden Township pool.

About 85% of the 2,200 wells in this area are operated by Carter. Louden is 15 miles long and 3 miles wide, and is Illinois' second-best producer—next to Centralia field. It was opened in 1937 and has produced 222,000,000 bbl. of oil. Most of the wells in this field are at about 1,500 ft. Water flooding has featured news events at Louden since 1950.

Geologists to tour McAlester basin

SOUTHWESTERN GEOLOGISTS will be given an opportunity to see first hand the McAlester basin of southeastern Oklahoma and northwestern Arkansas. This basin, one of the largest undeveloped prospective gas-producing areas in the country, will be toured by the Fort Smith Geological Society April 30 to May 2. The field trip will cover the western portion of the Arkansas Valley gas area.

The McAlester basin, Ouachita Mountains, Arkansas Valley and Boston Mountains region covers an area of about 21,000 sq. miles. Sediments range in thickness from 2,000 to 40,000 ft. Pre-Pennsylvanian beds include an almost complete section of Paleozoic rocks in the northwestern part of the region. Rocks range from Upper Cambrian through Mississippian. There are numerous unconformities and overlaps.

A great thickness of Pennsylvanian strata fills the basin between the Boston and Ouachita Mountains. Several gas fields have been opened here in recent fields. Development has been slow throughout the basin, but it is a region not to be overlooked for future exploration. Many tests need to be put down in this vast area before it can be fully evaluated.

It is hoped the coming field trip will stir interest in regional geologists' outlook in the area. Production comes from the Morrow and Atokan groups in the Pennsylvanian. There is very little oil in the basin—most of it being found on the west side in Oklahoma—but there are more than 75 gas fields scattered throughout the two-state area.

The widespread gas production indicates that more gas fields should be tapped in future exploration. Production has been moving steadily southeastward through the basin in recent years. This plus the favorable geologic conditions on the northwest side of the basin point up good oil potentialities for the area.

Those interested in this trip should contact Jack Shields, Fort Smith Geological Society, Box 1037, Station A, Fort Smith, Ark.

Texas' Barkley is extended

BARKLEY FIELD in northern Cherokee County has been extended to the northeast at Stroube Central Co. 1 Frank Ross. Initial tests of the Woodbine sand section flowed at the rate of 15 bbl. of oil an hour through ¼-in. choke. Tubing pressure was 240 psi. Perforation interval was not reported. The well was drilled to 4,242 ft., and cased with 4½-in. pipe to the bottom.

Location is ¼ mile south of the town of Mixon, on a 45-acre tract in Josiah Thomas Survey, A-831.

Texas wildcats tested

Flowing tests have been made on two discoveries in Throckmorton County, drilled by Tennessee Gas & Oil Co., a division of Tennessee Gas Transmission Co.

No. 1 Brown, located in the Bradley Garner Survey, 2 miles northeast of Liles field, flowed at the rate of 217 bbl. of oil a day from Mississippian limestone at 4,639 ft. The well had oil on drill-stem tests of the Caddo limestone at 4,154-77 ft., and the Strawn sand at 3,058-66 ft.

The same firm's 1-A Massey, 10 miles southwest of Throckmorton, in Section 1637, TE&L Survey, flowed at the rate of 120 bbl. of oil a day on drill-stem test of the Atoka conglomerate at 4,633-43 ft.

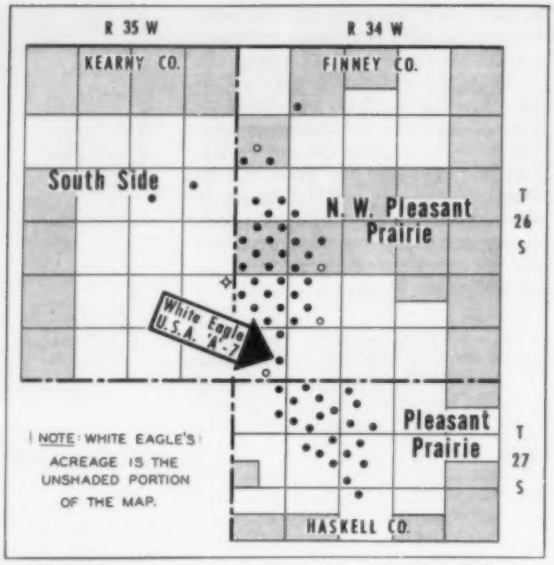
Kansans link two producing areas

WITH THE COMPLETION of its forty-first producing well in the Pleasant Prairie area in southwestern Kansas, White Eagle Oil Co. has linked two producing areas into one common oil field.

The Pleasant Prairie pool, discovered by White Eagle in 1954, has now been connected with the Northwest Pleasant Prairie pool, opened by the company in 1956.

The linking well is the White Eagle A-7 U.S.A. in the NE SE 31-26s-34w, Finney County. Total depth is 5,235 ft. After treatment with 1,000 gal. of acid the well swabbed 70 bbl. per hour for 4 hours after recovering the acid load. The well is now waiting on potential test.

White Eagle has had two drilling rigs steadily employed in the Pleasant Prairie area for the last 8 months. The company's forty-fourth well is now drilling with only one dry hole having been encountered. Production comes from the Mississippian formation (about 5,100 ft.) lying beneath the Hugoton gas pay which blankets White Eagle's 25,000-acre block.



TWO of the biggest pre-Permian oil pools inside Kansas' vast Hugoton area are now linked into one Mississippian field.

In addition to the Mississippian oil zone, some wells have been dually completed in the Morrow sand, and in other wells the Kansas City-Lansing is productive. Wells are spaced on 80-acre locations and have been assigned Mississippian allowables of 65 bbl. per day. The oil production is run to a new 6-in. pipeline which has recently been completed into the area by Jayhawk Pipeline Co.

Ohio pair completed

In Ohio two newly discovered successful oil wildcat wells were reported completed.

Kewanee Oil Co. moved 2½ miles

you are cordially invited to witness the

DRILLING MUD MIXING DEMONSTRATION

utilizing a

GORMAN-RUPP

3" SELF-PRIMING CENTRIFUGAL TRASH PUMP

at corner Silver Lane and Dawson Ave., at the

TULSA OIL SHOW

Also exhibiting in Booths 20, 21, 22 • California Building

HENRY H. PARIS DISTRIBUTOR INC., 1125 Rothwell Street, Houston, Texas
Gorman-Rupp Mid-continent & Gulf Coast Oil Field Representative

southeast of gas production in Washington Township, Coshocton County and completed 1 R. & M. Martin, Section 21. The test found the Clinton sand at 3,425-92 ft. with an oil and gas showing natural and gaged 30 bbl. oil and 300 M.c.f. in 24 hours after fracture.

Oriskany production of 55 bbl. of oil per day natural was found at 2,579-85 ft. in a scheduled Clinton test by Ohio Fuel Gas Co. 1 H. W. Gerber, Section 21, Sugar Creek Township, Wayne County. Plans for further testing of this area are under way.

Wildcat completed in Paradox

IN COLORADO, Lion Oil Division of Monsanto Chemical Co. has announced completion of a wildcat discovery well in the Paradox basin area of Montezuma County.

The 1 Retherford is located on a 1,800-acre block which is owned jointly with Gulf Oil Corp. The well was drilled to a total depth of 6,090 ft. and flowed 812 bbl. of 42°-gravity oil per day through a ½-in. choke from perforations in the Bluff Pennsylvanian sand. Also, 192 bbl. of oil per day were produced through a ⅝-in. choke from perforations in the Ismay Pennsylvanian sand.

The discovery is about 9 miles north of Towaoc, Colo. In addition to a one-half interest in the 1,800-acre block, Monsanto has approximately 1,300 net leasehold acres in the immediate vicinity.

Indiana Trenton test uncertain

COMMERCIAL OUTCOME of a northeastern Indiana wildcat test just south of the Michigan state line is uncertain but it will affect only in degree new exploratory push to the northwest in Branch and Calhoun counties, Michigan, as well as southeast in Indiana and northwestern Ohio.

I. D. Tenney 1 Esterline, SE SW, SW, 16-38n-1e, Steuben County, Indiana, logged Trenton at 2,867 ft. (elevation 1,049 ft.) and carried gas and oil 2,885 to 2,932 ft. However, after 5-in. casing was cemented at 2,931 ft. and test deepened to 2,961 ft., bailer test showed 150 ft. of brackish water and only trace of oil. No free oil was bailed after casing was set. Test was to be deepened.

Porosity section in dolomite alone on the test will be sufficient to encourage additional trend exploratory work.

McClure Oil Co. 1 Adolph, NW SW NW, Section 2-7s-6w, Branch County, 16 miles northwest of the Indiana test, logged Trenton at 3,010 ft. and bottomed out dry at 3,574 ft. Water zones were logged at 3,121 and 3,308 ft.

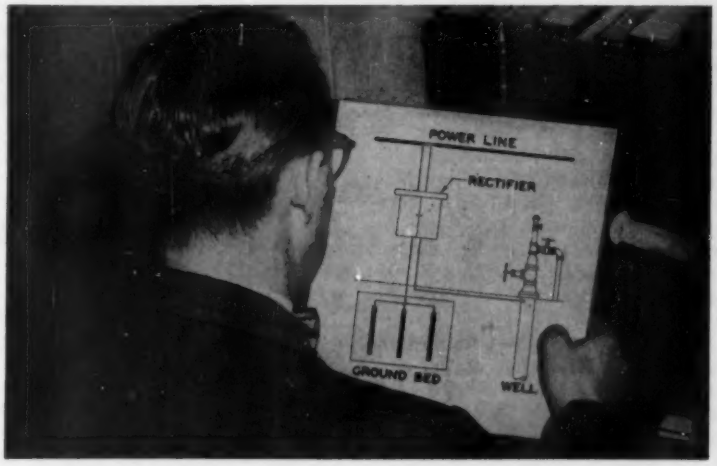
Illinois registers two new pools

Two new oil pools, Pixley in Clay County and Marion East in Williamson County, were discovered in Illinois in March.

There were two extensions to pools, as follows: one each in Harristown in Macon County and Calhoun Central in Richland County.

A total of 87 wells were completed in March, a 4-week period. The completions include 43 oil wells, or 49% successful.

In the first quarter of 1959, 453 wells were completed of which 229 were completed as producers, a success ratio of 51%. This compares with 489 completions of which 220 were producers in the first quarter of 1958, a success ratio of 45%. The estimated production for March is 7,022,000 bbl. of oil.



HOW A MAJOR OIL COMPANY USED RECTIFIERS TO STOP CORROSION OF WELL CASING

This major oil company has 33 of its wells in a pool in northwestern Kansas. Past experience indicated that external corrosion of casing would become a major maintenance item.

The wells were surveyed to determine the amount of induced current needed for cathodic protection. Then CSI was awarded a rectifier-installation contract on a competitive bid basis. Ground beds had to be individually designed for each well to meet the two-ohms circuit resistance specified.

CSI engineers furnished and installed 33 rectifiers, graphite anodes, coke breeze and all necessary connections. The job was finished ahead of the promised date, and to exact contract specifications. The cost was approximately $300 per well.

You'll find it pays to call CSI—for expert engineering, installation services and cathodic protection supplies—for both magnesium anode and rectifier installations. Estimates or quotations without obligation. Call or write today.

CSI

CORROSION SERVICES INCORPORATED

Cleveland 13, Ohio
1309 Washington Ave.
Tel. CHerry 1-7795

General Office, Tulsa, Okla.
Mailing Address:
Box 787, Sand Springs, Okla.
Tel. Circle 5-1351

Here's the Pacific Coast story

Los Angeles

An expensive soundproof, landscaped wildcat in metropolitan Los Angeles was being abandoned by Union Oil Co. of California after reaching 9,663 ft. The drill site for this test, 1 UST-U-19, was in a residential area of the city (See OGJ, Feb. 9, p. 68). It was originally taken to 5,734 ft., plugged back to 850 ft. and redrilled to the total depth of 9,663 ft. Objective was the only undrilled topographic high in the Los Angeles Basin.

A 1956 shallow gas-sand discovery in Glenn County's Beehive Bend gas field was recompleted by General Petroleum Corp. as an even bigger producer. When originally completed in a shallow sand at 1,860-82 ft. in August 1956, the well flowed at a rate of 3,710 M.c.f.d. through a 32/64-in. choke. For its latest completion, it was perforated in the interval 1,934-46 ft. for rates ranging from 4,900 M.c.f.d. through a 32/64-in. choke to 13 M.M.c.f.d. through a 1-in. choke.

This well, 1 Whyler-Capital Unit, is in the southern part of the field about 1 mile west of the field discovery well. General Petroleum was redrilling ahead below 6,240 ft. on a well originally completed in 1955 in the northern part of the field and was grading locations for three additional tests on the north edge of the field.

Oxnard extended

Production in the Oxnard field of Ventura County was extended 1,000 ft. northwestward by a completion by Standard Oil Co. of California in NW SW 36-2n-22w. The Standard well, 7 Maulhardt Community, was brought in flowing 118 bbl. daily of 22°-gravity crude from the interval 6,918-83 ft.

East Gosford

The Upper Stevens discovery of last month by Signal Oil & Gas Co. ½ mile north of East Gosford field in Kern County, has been given its second producer in a northwest offset.

The second well in the pool logged 220 ft. of Upper Stevens but was completed in only a total of 38 ft. between 6,775-7,200 ft. Initial production was 480 bbl. daily flowing through a 17/64-in. choke. Total depth was 8,018 ft. The well, 38-12 KCL, is located in SE SW 12-30s-26e.

Signal announced plans to continue development of this area opened last month by a well in NE NW 13-30s-26e. This discovery well, 41-13 KCL, flowed 218 bbl. daily through an 11/64-in. choke on completion.

San Joaquin

A rig count shows that the southern edge of the San Joaquin Valley continues to attract the most interest from oil companies with 21 rigs operating there. Of these, six are of the wildcat variety, four are significant extention tries and the balance are development wells.

The most interesting wildcats include:

...A wildcat Shell Oil Co. was drilling on below 13,638 ft. at Kelly Station in SE SE 23-11n-21w, 2 miles north of Pleito Creek field and 2½ miles northwest of Wheeler Ridge field. It is also about 2½ miles southeast of San Emidio Nose field.

...Standard Oil Co. of California was drilling below 2,633 ft. on a wildcat in SW NW 32-11n-22w, about 7 miles southwest of San Emidio Nose.

...Shell was drilling ahead below 3,850 ft. on a redrill of a wildcat in NW NE 5-10n-21w and was circulating a 10,133-ft. wildcat about 1,600 ft. northeast in SW SE 32-11n-21w. These two tests are about 5 miles south of the San Emidio Nose field.

B.C.'s oil may soon move out

BRITISH COLUMBIA is soon to have its first crude-oil gathering system if present plans are carried through to completion.

Two firms have made application to the British Columbia Government to build a line from that province's growing network of oil fields in the northeastern sector of the province and will be the first ones to be studied under new regulations regarding pipelines in that territory.

It could be said that the new applications are test cases and, therefore, it is not known how soon they will be processed. After that, the Alberta and federal Governments will also have to make their recommendations as both lines are scheduled to cross the Alberta-British Columbia border. However, the latter two will only have to act if B.C. is favorable.

Peace River Pipeline Co., Ltd., who constructed the line currently in operation from Sturgeon Lake to the Edson terminal of the Trans Mountain Oil Line that services Vancouver and Puget Sound areas, is behind one of the applications. The other has been tendered by Gibson Crude Oil Purchasing Co., Ltd., whose Western Canadian pipeline operations already serve such fields as Bellshill Lake, Rimby and St. Alberta.

The Peace River proposal will connect such northeastern British Columbia fields as Milligan Creek, Beatton River, and Boundary Lake to refineries in Dawson Creek and Grande Prairie. From the Grande Prairie refinery in Alberta, the line would then extend down to the north end of the presently operating Peace River line at Sturgeon Lake. On the other hand, it is understood that Gibson's proposal will carry the same crude only as far as the Grande Prairie refinery.

The Peace River line from the Dawson Creek region to Sturgeon Lake will be an 8⅝-in. artery from a point in 8-77-13w6 to a point in 31-71-23w5. The line from the Milligan Creek area to Dawson will run from Milligan via Boundary Lake and Dawson to 18-77-14w6. Details as to the Gibson proposal are still unavailable.

The fields from which the crude will be taken in the Milligan Creek and Beatton River areas were being constantly developed and explored during the past drilling season. Fairly good success was attained through those operations.

Add to that a very significant new zone discovery in the Beatton River district and you have a promising oil-development area. In addition, another discovery some 15 miles southeast of the most southerly of the Milligan Creek wells struck a good flow from the same structure as is being developed at Milligan Creek.

In the Boundary Lake region development has been rather slow this last season with exploration being the keynote. However, if one of the pipeline companies is successful in gaining a permit for construction more drilling will undoubtedly take place in this region early in the fall and next winter.

Rosebud County leads Montana drilling

Montana drilling centers in Rosebud County on the Central Plains. The Texas Co. is drilling at 1 NP "E," NW NW 31-11n-33e. This is a 5,225-ft. Van Duzen wildcat. Location is 1 mile southeast of Sumatra field Tyler sand production. At Sumatra, Texaco is testing on pump at the 7 Horgen in NW NW NW 13-11n-32e. Also drilling is 8 O'Neill-Ottman in NE NE 23-11n-32e. The bit is below 3,688 ft. at this Texaco well.

At Stensvad field, McAlester Fuel Corp. swabbed 11 bbl. of oil per hour at the 3-A Montana-Federal in SE SW 12-11n-31e. Honolulu Oil Corp. is coring below 5,501 ft. at 11-8 Stensvad, a north extension to this Tyler sand field, in C SE NE 11-11n-31e. Honolulu is below 4,012 ft. at 11-16 Stensvad, C SE SE 11-11n-31e. Swabbing is under way at a west extension, the 11-10 Stensvad, C NW SE 11-11n-31e. Pan American Petroleum Corp. is drilling below 425 ft. at the 3 Getchell, an extension well east of the field in C SW SE 12-11n-31e. Other wells have been staked by both McAlester and Honolulu.

Pure Oil Co. is busy at a Cambrian test on the east flank of Porcupine Dome. The 1 NP is in NW NW 25-12n-41e.

Sooner tripay well completed

NORTHWESTERN Oklahoma's important North Buffalo field got a triple producer last week. Sinclair Oil & Gas Co. 1 Rosa Lee Kuhn, C NW SE 6-28n-22w, Harper County, was completed in the Lansing, Oswego, and Kansas City limes, all Pennsylvanian zones.

From Lansing perforations at 4,582-4,612 ft. the well flowed 192 bbl. of 41°-gravity oil per day on 22/64-in. choke; from Kansas City at 5,216-26 ft. it flowed 144 bbl. of oil in 19 hours on 24/64-in. choke and 1,675 M.c.f.d. of gas; from Oswego it flowed 88 bbl. of oil and 1,620 M.c.f.d. of gas from 5,423-36 ft. on 20/64-in. choke.

The discovery well of this field, also a Sinclair well, was completed in Arbuckle Cambro-Ordovician last year. This well was hailed as the discovery highlight of 1958 in the northwestern Anadarko basin. It opened first geologically deep production in this portion of the basin; and, the well was the fourth Arbuckle producer in the entire region; one being in Kansas, one in Oklahoma, and the other in the Texas Panhandle.

Deep Jurassic try set for East Texas

LOCATION has been made for a deep Smackover wildcat in southern Cass County. Humble Oil & Refining Co. has spotted its 1 J. T. Hosey, 3½ miles southeast of Bivins in the Samuel Gregg Survey, A-394. Projected depth is 12,500 ft., or sufficient to test the Smackover.

Location is on a large block which

This advertisement is neither an offer to sell nor a solicitation of an offer to buy any of these securities. The offering is made only by the Prospectus. This is published on behalf of only such of the undersigned as are registered dealers in securities in the respective States.

New Issue — *April 7, 1959*

440,000 Shares

Tennessee Gas Transmission Company

4.72% Cumulative Convertible Second Preferred Stock

(Par Value $100 Per Share)

Convertible into Common Stock through April 1, 1969

Price $100 per Share

Plus accrued dividends from the date of issuance

Copies of the Prospectus may be obtained from any of the undersigned who are qualified to act as dealers in the respective States.

Stone & Webster Securities Corporation — White, Weld & Co.

Blyth & Co., Inc. — The First Boston Corporation — Eastman Dillon, Union Securities & Co.

Glore, Forgan & Co. — Goldman, Sachs & Co. — Harriman Ripley & Co. Incorporated

Kidder, Peabody & Co. — Lazard Frères & Co. — Merrill Lynch, Pierce, Fenner & Smith Incorporated

Paine, Webber, Jackson & Curtis — Smith, Barney & Co. — Dean Witter & Co.

PICTURED IS 200-MAN CAMP

Elder FIELD TRAILERS

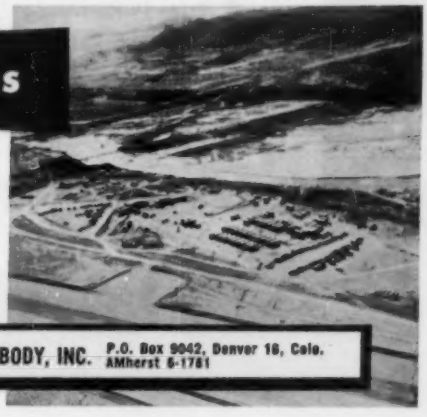
KNOCK-DOWN AND SKID MOUNTED UNITS AVAILABLE

ELDER field trailers are built to give long, trouble-free service under the toughest off-the-road conditions. You do not pay for house trailer frills. Sold to you direct . . . no middlemen involved.

WORLD-WIDE LEASING—Our special lease plan saves you money. You have no capital investment in trailers, and your leased trailers are chargeable to expense!

TURNKEY OPERATION—We'll operate your camp for you . . . furnish personnel, food, fuel, laundry and pick-up truck.

Kitchens, Diners, Sleepers, Showers, Offices, Power Plant and Water Tank Trailers.



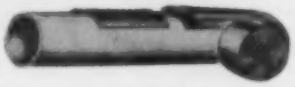
ALASKA: Specialized equipment for Alaskan operations—our complete Turnkey Operation available.

ELDER TRAILER AND BODY, INC. P.O. Box 9042, Denver 16, Colo. AMherst 6-1761

Humble has held for several years. It is approximately 3 miles north of nearest production in Cass Hill field, and 8 miles east of Pan American Petroleum Corp.'s prospective Cotton Valley discovery in the George S. Young Survey.

Production tests on 1 Giraud Gas Unit, Pan American's Cass County prospect, were due last week.

STOP
PIPELINE LEAKS
INSTANTLY



WITH PIPE GASKET PATCH
BY
DALLAS

WRITE FOR FREE LITERATURE
AND INFORMATION ABOUT
25' TEST ROLL.

DALLAS MFG. COMPANY
3505 GREENBRIER DRIVE
Dallas, Texas

Four rigs drilling on Alaska tests

FOUR active drilling projects were under way in Alaska—two on Kenai Peninsula, one on the Alaskan Peninsula on the Cook Inlet side, and one at Cape Fairweather.

A rundown on them looked like this:

... **Standard Oil Co. of California** was redrilling below 4,635 ft. on 4 Swanson River on the Kenai Peninsula. This test was originally drilled to 12,582 ft. before being plugged back for the redrill.

... **Halbouty Alaska Oil Co.** was drilling below 9,841 ft. on its wildcat also on the Kenai Pensinsula near the Swanson River Unit.

... **Alaska Consolidated Oil Co.** was drilling below 5,240 ft. on a wildcat in the Iniskin Bay area on the Cook Inlet side of the Alaskan Peninsula.

... **Colorado Oil & Gas Corp.** was redrilling below 10,437 ft. on 3 Yakutat in the Cape Fairweather-Icy Bay region.

Elsewhere in Alaska, General Petroleum Corp. was readying a drill site on the west end of Becharof Lake on the Bristol Bay area of the Alaskan Peninsula. Union Oil Co. of California was building a road to a drill site for its wildcat to be drilled about 5½ miles south of Kenai River on the Cook Inlet side of the Kenai Peninsula.

Richfield Oil Corp. announced plans to drill a test at Cape Yakataga near the town of Yakataga. This area is about 75 miles east of the old Katalla oil field which was abandoned in 1933.

Shell completes North Texas opener

Southeastern Hardeman County's Mississippian discovery has been completed for 226 bbl. of 48° oil a day, flowing through small choke.

Shell Oil Co. 1 C. G. Conley, located 8 miles west of Chillicothe in Section 81, Block H, W&NW Survey, was completed from open hole in the Mississippian at 7,800-8,008 ft. The 226-bbl. gage was through 32/64-in. choke.

The well has attracted considerable interest due to its geological location —being on the extreme southeastern

Oil Loans

ROBERT F. CASHEN, Assistant Vice President
Manager, Petroleum Department

We take pleasure in announcing that

MR. GENE M. WOODFIN

has been admitted to

general partnership in our firm

Carl M. Loeb, Rhoades & Co.

April 1, 1959

tip of the Palo Duro basin, according to some geologists.

Nearest Mississippian production is 15 miles northeast in Odell field, in Wilbarger County. Nearest production of any kind is approximately 7 miles to the northeast in the Chillicothe-Strawn field. Quannah field, 8 miles to the northwest, produces from the Missouri (Canyon?), at 5,832 ft.

Formation tops in 1 Conley were: Gunsite 2,992 ft., Palo Pinto limestone 5,198 ft., Des Moines 5,696 ft., Morrow 7,000 ft., Mississippian 7,522 ft., Chappel 7,790 ft., and the Ellenburger at 8,060 ft. Derrick-floor elevation was 1,481 ft.

West Texas data book released

Petroleum Review, Cochran and Hockley counties, Texas, is ready for distribution by Phifer Petroleum Publications, Houston. The new oil reference book is the latest in a series which outlines the discovery, development, and production of oil and gas in West Texas.

The review was compiled from the records and hearing files of the Texas Railroad Commission. The new book offers a complete history of the 39 fields that have been discovered in the two counties since 1936.

The individual field record lists location, discovery well, surveys (block and section numbers), known subsurface structural data, rules and regulations, and other pertinent facts and figures. Production for each field through 1958 is given by years and cumulatively, listing the number of producing wells. Among the illustrations in the book are 13 subsurface structure maps and 21 logs of discovery wells. There is also a map of the two counties with the fields in color. Information is current through March 1959.

Copies are available from the publisher at P. O. Box 20,024, Houston 25.

Producing formations of the Permian basin

The 1959 issue of Southwest Mapping Co.'s Executive Map, showing producing formations of the Permian basin in colors, has been announced.

The map shows all of the oil fields in the basin in color, classified according to formations from which they produce. The base map shows sections, surveys, towns, railroads and field names. Wildcat dry holes and drilling wells to February 1, 1959, are identified by operator and farm names, and total depths.

This seven-color map is available

BUYING A NEW RIG?
National Torque Converters are available as original equipment on 10 leading makes of rigs
REPOWERING YOUR PRESENT RIGS?
National Torque Converters are available "packaged" or matched with virtually all makes of oil field engines
NATIONAL
NATIONAL

In any drilling operation today, it's a must to get the most results with the least investment. That's why it is important to equip with National Torque Converters. They can help a rig to make more hole faster, with less strain on operator and equipment, more useful work between overhauls, and with dependability that has run up to three quarter million feet of hole with no shutdowns.

You can get all these advantages in a new rig . . . because the National Torque Converter is available as original equipment on ten of the best-known makes.

You can get these advantages in repowering old rigs . . . for National Torque Converters can be ordered "packaged" with the engines of eight of the leading manufacturers . . . and matched to operate perfectly with the engines produced by virtually all other builders.

If you want to know about the service and advantage of the converters just ask a man who has used them. If you want to know about getting the advantages for your own rigs . . . just write:

THE NATIONAL SUPPLY COMPANY

Subsidiary of Armco Steel Corporation

TWO GATEWAY CENTER, PITTSBURGH, PA.

on paper or plastic. Scale is 1 in. to 4 miles. The map comes in two sections (north and south), but is available as a single sheet, ready to mount. Size of each section is 34 by 50 in.

Three basins feature Wyoming drilling

Wyoming exploration last week included developments in the Powder River, Big Horn, and Green River basins.

In Powder River, Davis Oil Co. is completing at its Brown Ranch discovery in Weston County. This Newcastle sand discovery flowed 10 bbl. of oil per hour during early tests. Davis will also drill a wildcat 4 miles northwest of Robinson Ranch field in Crook County. This one will go to Minnelusa Pennsylvanian, the prime target in today's program in this northeastern Wyoming basin.

In the Big Horn Texaco will go to 10,500 ft. at a wildcat in the southeast Neiber Dome area, Washakie County. This Phosphoria and Tensleep wildcat is about 1 mile east of a discovery drilled in 1954 by The California Co.

Green River basin action includes a new wildcat slated for Mesaverde at about 8,000 ft. by Caulkins Oil Co. 13 miles southwest of Little Work Creek field in Sweetwater County. Forest Oil Co. tested Almond sand at its discovery south of Desert Springs in Sweetwater County. Flow was 9,500 M.c.f.d. of gas.

Oklahoma gas pool stretches southwest

A gas pool in southeastern Oklahoma's portion of the McAlester-Arkansas Valley basin was extended by Superior Oil Co.

The 1 Wood Unit, C SE 15-12n-16e, McIntosh County, flowed 5 M.M. c.f.d. from basal Atoka Pennsylvanian perforations at 2,322-42 ft. This moves the unnamed gas field southwest.

Oil flows at New Mexico well

Flowing Gallup oil production is reported at a Standard Oil Co. of Texas wildcat in northwestern New Mexico's San Juan basin.

The 1 Federal 12-5 had a potential of 241 bbl. of 40°-gravity oil per day, based on a 16-hour test on 25/64-in. choke. Production is at 5,900 to 6,200 ft. This new oil pool is 5½ miles east of Verde-Gallup field in SE SW 5-31n-13w, 12 miles north of Farmington.

Dakota production reported at Gallegos

Good Dakota production is reported in the Gallegos area of San Juan County, San Juan basin, northwestern New Mexico.

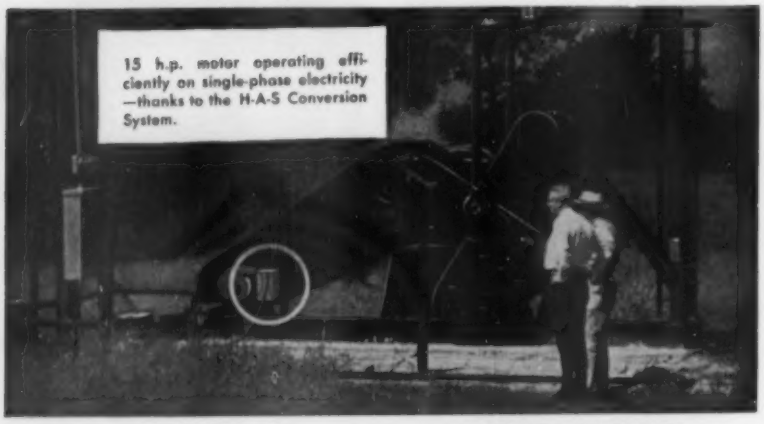
El Paso Natural Gas Products Co. 1-D Delhi-Taylor Pool Unit, 1 mile northeast stepout from Gallegos Dakota pool, had a calculated absolute open-flow potential of 10,678 M.c.f.d. from Dakota Cretaceous perforations at 6,344 to 6,422 ft. Production is through ¾-in. choke. Location is in SW SW 3-26n-11w, 13½ miles south of Bloomfield.

Texas' Terrell has oil, gas shows

One of Terrell County's remote and deep wildcats has reported light oil and gas shows on initial tests of the Ellenburger.

The well is Ohio Oil Co. 1-TA Ohio-Pure-University, 16,000-ft. exploration 16 miles southwest of Sheffield, and approximately 16 miles northwest of Brown-Bassett field.

On ground elevation of 2,500 ft., operators reported top of the Ellen-



Write for this NOW!

"How to use three-phase motors on SINGLE-PHASE CURRENT"

. . . and profit from the added economy and efficiency!

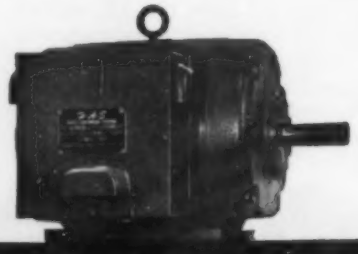
Three-phase motors cost less than single-phase motors, are more efficient and have far greater salvage value.

The New H-A-S Phase Conversion System enables you to use three-phase motors (3 h.p. or larger) on 220 V single-phase current. Three-phase motors cost less, operate for less, and can be used later on three-phase current.

The H-A-S is available in two models, for motor mounting and remote mounting.

On many rural single-phase lines service is limited to 5 h.p. single-phase motors, but the H-A-S Phase Conversion System permits the use of three-phase motors up to 75 h.p.

This is GOOD NEWS in the oil country. To solve an immediate problem—or for your files—write NOW for complete details and the name of your nearest supply store or distributor!



KEN ELLIOTT MOTORS, Inc.
P. O. Box 5158-A
BOSSIER CITY, LOUISIANA

H-A-S PHASE CONVERSION SYSTEM

burger at 13,330 ft. A 2-hour test at 13,345-13,447 ft. recovered 2,000 ft. of gas in the drill pipe, plus 50 ft. of gas-cut mud, with a rainbow show of oil. Flowing pressure ranged from 1,168-91 psi. Shut-in pressure read 1,556 psi. in 30 minutes. Drilling continued after the test.

Other formation markers at 1-TA Ohio were: Strawn 10,575 ft., Woodford 11,022 ft., Devonian 11,205 ft., Fusselman 11,706 ft., Tulip Creek 12,150 ft., McKee 12,370 ft., and Waddell 12,850 ft. Location is in Section 14, Block 37, University Lands Survey.

Bone Spring shows in Winkler County

Gas production in the Bone Spring (Lower Permian) was indicated last week at Pan American Petroleum Corp. 1 Ida Hendrick "B," scheduled 11,500-ft. wildcat test in western Winkler County.

A drill-stem test at 10,400-29 ft. open 1 hour, had gas in 14 minutes, then through 1-in. choke gaged 750 M.c.f. of gas. Recovery was gas-cut mud. Flowing pressure was around 675 psi., increasing to 5,095 psi. in 15 minutes when shut in. Calculated open-flow on the same test was at the rate of 1,150 M.c.f.d.

Operators drilled ahead following the test. Location is in the NW NW Section 31, Block 26, PSL Survey, and 7 miles west of Kermit.

Discovery wells

WESTERN CANADA

Alberta: Home-Royalite 11-11-13-19 Enchant, LSD 11, 11-13-19w4. Glauconitic oil discovery. TD 4,256 ft.

Home-FPC 10-15-66-9 Morse River, LSD 10, 15-66-9w5. Slave Point oil discovery. TD 8,331 ft.

H.F. 10-11-26-8 Heathdale, LSD 10, 11-26-8w4. Viking gas discovery. TD 3,530 ft.

British Columbia: Gulf State 3 Kotcho Lake, Unit 67, Zone K., N.T.S. Map 94-I-14 Slave Point gas discovery, TD 6,702 ft.

Union-Hudson's Bay D20-H Milligan Creek, 20-H-94-H-2. Triassic gas discovery. TD 3,700 ft.

Saskatchewan: Stekoll 1-28 Kiebasa, LSD 1, 28-2-14w2. Midale oil discovery. TD 6,103 ft.

CALIFORNIA

Kern County: Pacific Oil & Gas Development Corp. 53-30 Brayton, SW NE 30-25s-27e, IPP 48 BOPD rate, 19° gravity, perfs. 4,200-27 ft., TD 4,260 ft., redrilled TD 2,227 ft. (New Famoso sand, Eocene, field discovery 3½ miles southwest of Jasmin field.)

Kings County: Beach, Church & Bell 1-13 Southlake Farms, SW NW 13-23s-21e, IP 936 M.c.f.d., ¼-in. choke, perfs. 2,794-99 ft. in Mya sand (Eocene), TD 3,210 ft. (New pool discovery and ¾-mile SE extension to Harvester field.)

KANSAS

Rawlins County: Miles Jackson 1 Ruda, NW NW NW 23-4s-33w. IPP 87 BOPD, Lansing-Kansas City, new pay, OWWO. OTD 4,493 ft.

MONTANA

Dawson County: The Texas Co. 1 M. N. Guelff, SE NE 4-15n-54e. IPF 470 BOPD, 1 BWPD Silurian; IPP 108 BOPD, 125 BWPD, Red River Ordovician. TD 9,684 ft. Silurian and Ordovician dual-zone discovery, new field.

NEW MEXICO

Lea County: Bishop Canyon Uranium Corp. 1 C. M. Griffin, 10-18s-38e, 6 miles northeast of Hobbs. IP swabbed 63 BO, 7 BWPD, 30°, perforated 4,800-06 ft. TD 4,995 ft.

Harvey E. Yates 1 Sweeney, 25-18s-32e, 2 miles southeast of Queracho Plains field. IP 120 BOPD, 14/64-in. choke, 36.6°, TP 40 psi., perforated 6,860-75 ft. Recompletion. OLD TD 9,593 ft., PB 8,484 ft.

John H. Trigg 1-7 Pan American-Federal-Kelly, 7-25s-36e. IP 47 BOPD, 16/64-in. choke, 33°, GOR 1,378:1, CP 450 psi., Tansil 3,508-26 ft. TD 4,055 ft.

NORTHWEST NEW MEXICO

Rio Arriba County: W. R. Johnston, Warren Shear 1-1 Jicarilla, NE SW SW 1-24n-4w. IPF 1,914 M.c.f.d., 28 bbl. dist. in 3 hours, Graneros discovery, new pay. TD 7,695 ft. Dakota. New pay discovery.

El Paso Natural Gas Co. 98 San Juan Unit 28-7, SW NE 29-27n-7w. IPF 1,621 M.c.f.d., Mesaverde; IPF 2,187 M.c.f.d., Dakota. Dakota discovery, new pay. TD 7,540 ft. Morrison 7,503 ft.

San Juan County: Universal Oil Co. 2 Navajo, SE NW 17-29n-18w. IPP 2 BOPD, Gallup discovery, new field. TD 100 ft.

OKLAHOMA

Alfalfa County: Woods Petroleum Co. 1 State, C NW SE 33-28n-11w, 2 miles southwest of Driftwood, IP 4 M M.c.f.d. Mississippi Chat 5,109-32 ft., 24/64-in. choke. TD 5,150 ft. Gas discovery on northern shelf of Anadarko basin in north-central Oklahoma.

NORTH TEXAS

Archer County: Graridge Corp. 2 Mahler Dearing, Sec. 19, Blk. 1, H&TC Sur., 5 miles southwest of Wichita Falls. New pay discovery in Regular field. IP 239 BOPD, 32/64-in. choke, 40°, GOR 1,340:1, TP 205 psi., Ellenburger pay 5,386 ft. TD 5,402 ft.

Grayson County: Shell Oil Co. 1 R. L. Sweeney, J. Doniphan Sur., A-385, 6½ miles southwest of Pottsboro. New pay in Big Mineral, Southeast field. IP 191 BOPD, 18/64-in. choke, 35°, GOR 1,700:1, Pennsylvanian (V sandstone) 8,216-34, 8,250-62, 8,274-88 ft. TD 8,647 ft., elevation 684 ft.

Knox County: W. M. Null 1 Thomas D. Harlan, Sec. 101, Blk. 45, H&TC Sur., 1½ miles west Goree, ¾ mile northwest production. IPP 61 BOPD, 36°, Tannehill 1,864-74 ft. Originally completed dry at 1,995 ft., TD.

American Petrofina Co. of Texas 1 J. H. Davis, Sec. 56, G. G. Alford Sur., A-2, 3 miles west of Knox City, 1 mile southwest production. IPP 67 BOPD, 35°, GOR 240:1, Tannehill 2,,324-29 ft. TD 5,059 ft., PB 2,273 ft.

Wichita County: Paul R. Mays 1 Raymond Herschi, Sec. 834, David Cowan Sur., 12 miles west of Burkburnett. IPP 40 BOPD, 40°, GOR 450:1, Upper Gunsite 1,822-27 ft. TD 1,863 ft. New pay discovery.

Young County: A. F. Knappenburger 1 Roach heirs, J. Stinnett Sur., A-1753, 3

USED AND RECOMMENDED

. . . *especially* under conditions where DRAG, TORQUE, OR THE HAZARD OF STICKING DRILL-PIPE, LINER AND CASING are encountered.

SIX YEARS OF FIELD EXPERIENCE

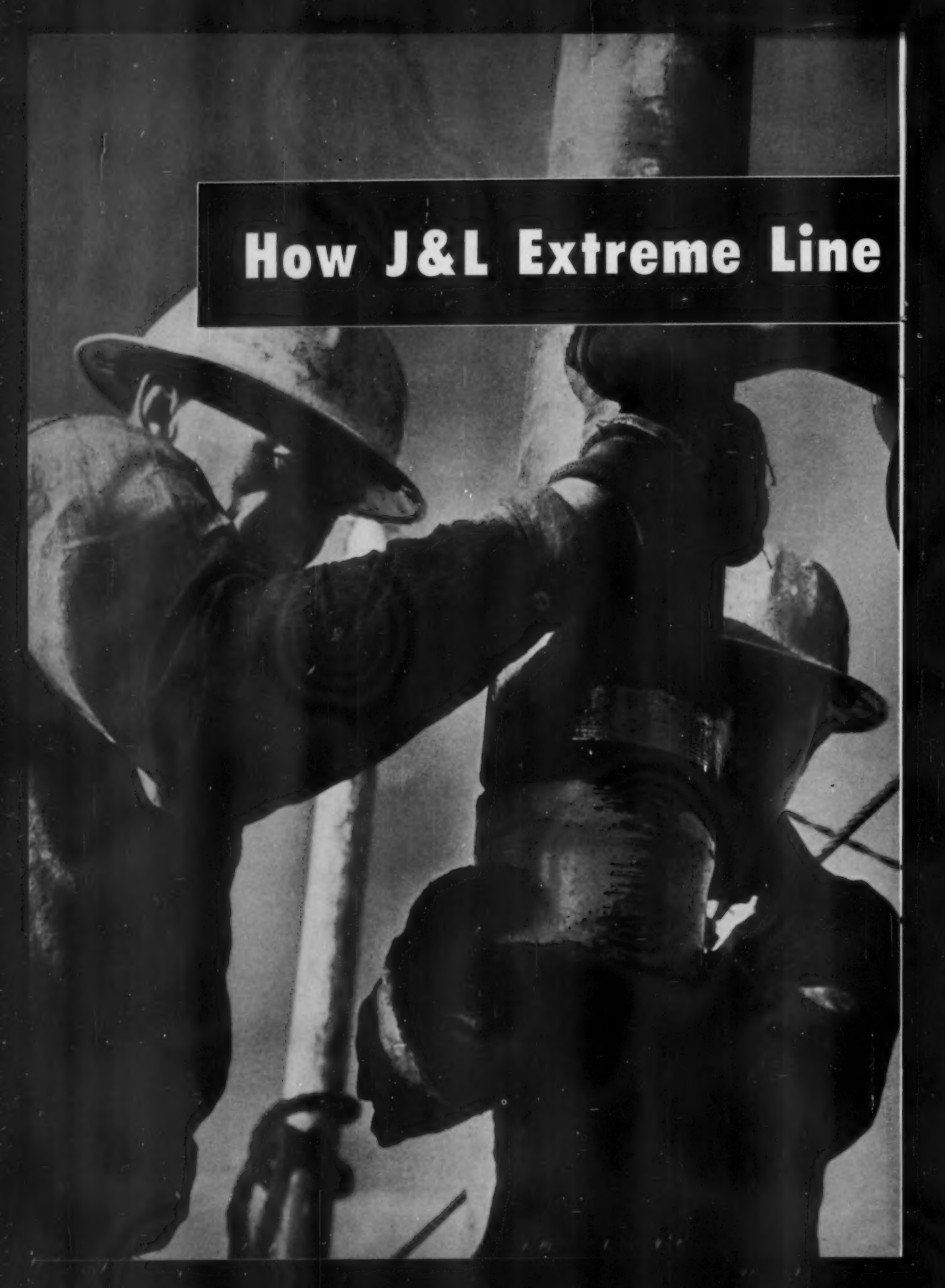
have proved the effectiveness, versatility and trouble-free application of

92 SOUTHWESTERN FLAKE GRAPHITE

Available through your mud dealer.

92 SOUTHWESTERN GRAPHITE CO.

BURNET, TEXAS


How J&L Extreme Line

Gives You Absolute Sealing

J&L Extreme Line Casing joints have radial and conical sections, completely independent of the threads, which provide a positive seal unaffected by the most extreme internal or external pressures.

Upset box and pin ends, plus modified Acme-type threads with a steep flank angle, also provide high joint strength for long strings in deep holes.

J&L Extreme Line integral joints are streamlined inside and out. The relatively light external upset decreases the possibility of hanging up — you can safely run this casing through packers under pressure.

You get fast, trouble-free running-in speeds. You stab easily, and you cannot cross-thread. You make up with five to seven turns with the spinning line and less than one turn with the tongs.

You get *everything* in *J&L Extreme Line* made under license from The National Supply Company — high strength in tension, burst and collapse — *and* leak resistance! *This is casing that can be salvaged and re-run repeatedly.*

Call one of our specialists now, or write us at Tulsa.

Jones & Laughlin

SUPPLY DIVISION – Tulsa

If it's sold by J&L....
It's the best available

74

DRILLING EQUIPMENT: JONES & LAUGHLIN DRILL PIPE, CASING AND WIRE ROPE, GARDNER-DENVER MUD PUMPS, IDECO DRILLING RIGS, REPUBLIC ROTARY HOSE. PRODUCTION EQUIPMENT: JONES & LAUGHLIN CASING, TUBING, LINE PIPE AND WIRE ROPE, AXELSON PUMPS AND SUCKER RODS, CABOT PUMPING UNITS, CENTURY MOTORS, FAIRBANKS-MORSE ENGINES, CONTINENTAL TANKS.

miles northwest Eliasville, ½ mile southwest production. IP 169 BOPD, 16/64-in. choke, 40°, GOR 450:1, TP 100 psi., pay 2,360 ft. TD 2,366 ft.

TEXAS PANHANDLE

Ochiltree County: Apache Producing Corp. 1-307 Dickinson, 17 miles south of Perryton in Sec. 307, Blk. 43, H&TC Sur. IPF 807 BOPD, 24/64-in. choke, 37.9°, perfs. 8,756-58 ft. Morrow sand TD 8,970 ft. New oil discovery.

WEST CENTRAL TEXAS

Callahan County: Hilburn-Hawn Co. 1 Pechacek, Sec. 12, Blk. 8, SPRR Sur., 5 miles southwest Clyde. IPP 28 BOPD, 38°, Cook sand 1,778-1,812 ft. TD 2,034 ft.

June Faye Gray 2 Dave Ingram, Blk. 66, Comal CSL Sur. 181, 5 miles southwest of Cross Plains. IP 126 BOPD, 30/64-in. choke, 43°, GOR 380:1, Cross Plains sand 1,550-54 ft. TD 1,549 ft.

Jones County: Joe Saita & Dorman Anderson 2 Scott-Turner, Sec. 134, Blk. 1, BBB&C Sur., 7 miles northeast of Hamlin. IPP 154 BOPD, 38°, GOR 100:1, Tannehill sand 2,455-70 ft. TD 3,302 ft.

Callihan Interest, Inc. 2 Roy E. Pritchard, G. Martinez Sur. 195, Subdivision 15, 3 miles north of Hawley. IPP 11 BOPD, 35°, GOR 185:1, pay 2,075-83 ft. TD 2,458 ft.

Shackelford County: Leo Vesenmeir, Jr. 1 Ross Sloan Tract 5, J. M. Peveler Sur. 1, 12 miles southwest of Woodson, IP 178.6 BOPD, 10/64-in. choke, 42°, GOR 1,500:1, TP 860 psi., Mississippian 4,341-46 ft. TD 4,347 ft.

Leo Vesenmeir, Jr. 1-C Ross Sloan Tract 1, Nancy Williams Sur., 14 miles southwest Woodson. IP 203 BOPD, 8/64-in. choke, 42°, GOR 550:1, TP 840 psi., Mississippian 4,579-85 ft. TD 4,600 ft.

Stephens County: General Crude Oil Co. 3-A Ed Ford, Sec. 1083, TE&L Sur., 4 miles east of Ivan. IP 81 BOPD, 16/64-in. choke, 43°, GOR 283-1, TP 80 psi., pay 4,384 ft. TD 4,403 ft.

Magnolia Petroleum Co. 1 Eugene Tipton, Sec. 116, TE&L Sur., 13 miles northwest Breckenridge. IP 131 BOPD, 14/64-in. choke, 42°, GOR 1,630:1, Marble Falls conglomerate 4,226-28 ft. Recompletion. Old TD 4,280 ft., PB 4,248 ft.

Stonewall County: Coastal Drilling Co. 1-A Bledsoe, Sec. 5, Blk. A, AB&M Sur., 5 miles southwest of Old Glory. IPP 25 BOPD, 41°, GOR 310:1, Swastika sand 3,443-53 ft. TD 3,595 ft.

Taylor County: J. R. McLean et al. 2 W. S. Shaffer, Sec. 12, Blk. 3, SPRR Sur., 7 miles northwest of Guion. IPP 67 BOPD, 41°, GOR 405:1, Flippen sand 2,869 ft. TD 2,876 ft.

Throckmorton County: Strawn Drilling Co. 1 R. H. Kelly, J. B. Graham Sur., A-1421, 12 miles south of Throckmorton. IP 84 BOPD, 20/64-in. choke, 43°, GOR 400:1, TP 100 psi., Strawn 3,384-87 ft. TD 4,700 ft.

Sunray Mid-Continent Oil Co. 1 T. J. Pendergrass, Sec. 220, BBB&C Sur., 5 miles southwest of Throckmorton. IP 240 BOPD, 16/64-in. choke, 41°, GOR 720:1, TP 510 psi., Caddo 4,887-97 ft. TD 5,100 ft.

WEST TEXAS

Andrews County: Pan American Petroleum Corp. 1-A David Fasken, Sec. 31, Blk. 41, T2N, G&MMB&A Sur., 15 miles southeast of Andrews. IPP 124 BOPD, 30°, GOR 64:1, Grayburg 4,828 ft. TD 5,252 ft.

Crockett County: Pan American Petroleum Corp. 1 University "DL," Sec. 31, Blk. 7, University Lands Sur., 10 miles southwest of Big Lake. IP 261 BOPD, 20/64-in. choke, 42.6°, GOR 1547:1, TP 600-160 psi., Strawn 8,339-45, 8,612-22 ft. TD 9,600 ft.

Ector County: Continental Oil Co. 1 Kloh "C-19," Sec. 19, Blk. 45, T1N, T&P Sur., 7 miles north of Notrees, Wichita Albany discovery in G&W field. IP 188 BOPD, ½-in. choke, 33°, GOR 950:1, TP 160 psi., Devonian 8,050-71 ft.; IPP 105 BOPD, 30°, GOR 575:1, Wichita Albany 6,900-7,159 ft. TD 8,130 ft.

Gaines County: Lone Star Producing Co. 1 Magnolia & Atlantic Fee, Sec. 3, Blk. G, C&MRR Sur., 27 miles northeast of Seminole. IPP 23 BOPD, 31°, GOR 60:1. Permian 4,836-52 ft. TD 9,032 ft.

Pecos County: British American Oil Producing Co. 1 Moore & Gilmore, Sec. 6, Blk. 10, H&GN Sur., 10½ miles southwest of Imperial. IP 4,400 M.c.f. gas, calculated open-flow, Fusselman 5,888-5,904, 5,918-38 ft. TD 6,023 ft.

Reagan County: Amerada Petroleum Corp. 1 Hickman, Sec. 4, HE&WT Sur., 9 miles southeast of Big Lake, in Barnhart-Ellenburger field. Recompletion. IPP 75.7 BOPD, 34°, Wolfcamp 7,458-7,532 ft. TD 9,264, PB 7,942 ft.

Schleicher County: Tucker Drilling Co. 1 Thad A. Thompson estate, Sec. 11, Blk. A, HE&WT Sur., 5 miles southeast of Eldorado. IP 1,400 M.c.f. gas, Strawn reef 6,437-49 ft. TD 6,998 ft.

UTAH

Carbon County: Great Lakes Natural Gas Co. 1 Unit, SW NE 13-12s-14e. IP 5 M.M.c.f.d., open, Wasatch discovery, new field. TD 5,515 ft. Wasatch.

All wet, yet Perfectly Dry
. . . because moisture is locked out
NEW
R&M
"All Weather 40"
OIL COUNTRY MOTORS
Here's how R&M "weatherizes" motors! It undercoats steel parts with a rust-resistant . . . treats iron parts with anti-corrosion primer . . . varnish-dips and bakes windings twice. Terminal box is gasketed . . . power leads sealed at shell. Baffles lock out wind-driven rain. Rodent screens are factory-installed. Yet these dependable R&M 40° heat rise motors cost no extra! Write today for Bulletin 520-OGJ
ROBBINS & MYERS, INC.
MOTOR DIVISION • SPRINGFIELD, OHIO

Curtis Links Lab and Field Work

. . . with a tactful approach in his new role as executive vice president of Jersey Production Research in Tulsa.

SPARROWS and pigeons perched on rafters above his ceilingless office, in a galvanized-iron warehouse, when he tackled a research laboratory job in Tulsa 20 years ago.

Today, he's executive vice president of Jersey Production Research Corp.

Location of the lab is the same. It then was operated by Carter Oil Co., a Jersey affiliate. Now, there is a spic-and-span brick structure, carpeting, and the office decor that go with research rank.

Weighty titles do not dim the pleasant reserve of R. C. (Rusty) Curtis. He's tall, has a spring in his step, is as much at home clambering up a rig as surrounded by beakers and masses of instrumentation.

He has been a Jersey man all his business life.

Born in Abilene, Tex., he early evidenced a yen for formulas and experiments. He completed the chemistry, biology, and physics courses offered in high school. Taking frogs and worms apart as classroom work, to learn what made them hop and wriggle, intrigued him.

Roustabout role . . . The bio-chemical interest went with him to Texas A. & M. College.

There it did a double flip. First, he gave up medical chemistry and veered to oil refining. Odors dulled his ambitions. Refineries, he says, seemed "too smelly." He chose the open-road route, became a chemical engineer-at-large.

Before getting his degree in 1937, he was interviewed by Carter recruiter M. L. (Mike) Haider, now a Jersey director. He did a beeline from the campus to Oklahoma City, served a hitch as roustabout and rod and tubing helper in Oklahoma City field.

Drilling and mud logging work on a western Oklahoma wildcat followed several months' work in Tulsa's Carter headquarters offices.

He then had a hand in reservoir engineering and pressure maintenance in South Burbank field, spiced with bunkhouse living. Laboratory work in Tulsa was being broadened.

Curtis was loaned to the lab for studies on radial flow of fluids, casing collapse, and reservoir analysis. He later was drafted for engineering assignments and was Carter's senior petroleum engineer when he entered military service in 1941.

R. C. Curtis
. . . roustabout to researcher.

Military bombardier . . . He trained as a bombardier and by 1943 was spotting gnat-size targets through dense fog over Germany from the England-based Eighth Air Force. He flew 21 combat missions.

Curtis' plane was hit over Germany and crash landed in England after a shaky run. He crawled out of his bubble unhurt, later receiving the Distinguished Flying Cross.

Capt. Curtis returned to Carter and swung into the administrative groove. He was northern division production manager at Billings, Mont., then went to Tulsa as assistant to the Carter president. In 1955 he moved to Mattoon, Ill., as eastern division manager, handling operations in Illinois, Indiana, Kentucky, and Michigan.

Research beckoned again in 1958. He was named vice president for administration of the Jersey research organization in Tulsa. In March this year, he was elected executive vice president.

His air training was taken at Dyersburg, Tenn., just a fast air-fighter hop to St. Louis. There, he met Miss Margery Miller at a military function. They were married in October 1945.

The whole family leans to water.

Mrs. Curtis is an expert swimmer. That's why Suzanne, 12, and Marc, 8, can outmaneuver a fish in any pond.

Sailboating is the family hobby. The 15-ft. "cat" boat now is pulling at its moorings in the backyard, soon will see duty on Oklahoma lakes. Mrs. Curtis is skipper and can duck a boom with the best of landlubbers.

Art and water . . . Three years ago the versatile chemist-engineer went to night school in Mattoon and studied art. Now his house is dotted with oil paintings. Most are seascapes.

Civic and community responsibilities he's taken in stride. He also served as Illinois Basin chapter chairman for the API, has been on API production study and engineering committees.

This relaxed Texan deftly hides any surface hint of genius with easy mannerisms.

His 22-year petroleum career has found him dabbling expertly in a variety of assignments. He's emerged from each one with a full head of steam, hurdling to more challenging spots.

From a second-floor office vantage point, he now ogles the birds outside his window, in trees on landscaped grounds, and ponders new procedures which might help whip Jersey's production problems world wide in Sumatra, Arabia, Canada, the U. S., and the Maracaibo country.

Curtis has made the circuit from rig floor to lab to field application of research techniques to lab again.

Along this roller-coaster route, he's soaked up a special brand of scientific savvy that today is helping make the wheels of a 300-man research team hum.

●

Bibb Maples, petroleum engineer, has been assigned to western Venezuela by Mene Grande Oil Co. Maples was with Pan American Petroleum Corp. before joining Mene Grande.

William C. Goodson, senior reservoir engineer for Republic Natural Gas Co. in Dallas, has been promoted to manager of the gas department and technical assistant to the vice president.

D. R. Wofford, Texas Gas Transmission Corp., Owensboro, Ky., has been elected president of Petroleum Industry Electric Association. He succeeds **E. H. Wilder,** Sun Oil Co., Beaumont, Tex., who becomes PIEA chairman. **C. E. Upson,** Texas Illinois Natural Gas Pipeline Co., Chicago, was named vice president of the association, and **E. B. Dunn,** Atlantic Pipe Line Co., Philadelphia, was reelected treasurer.

▶ ▶ ▶ Personals

Sydney T. Ellis, executive vice president of Commercial Solvents Corp., has resigned to become president of Petro-Tex Chemical Corp., subsidiary of Tennessee Gas Transmission Co. and Food Machinery & Chemical Corp. He will headquarter in Houston. Petro-Tex was formed in 1955 to buy butadiene - manufacturing facilities from the U. S. Government, which was then disposing of its synthetic-rubber plants. Ellis succeeds **Joseph R. Mares,** who left the company last July to accept a technical assignment in Washington. The company has been managed by an executive committee since that time.

ELLIS

Ralph T. McElvenny, chairman of the board and chief executive officer of Michigan Consolidated Gas Co., has been elected president and chief executive officer. A new board chairman will not be elected, and duties of the chairman will be consolidated with those of the president. **Wilber H. Mack,** executive vice president and a director of Michigan Wisconsin Pipe Line Co. and American Louisiana Pipe Line Co., has been elected a director of Michigan Consolidated. The positions of president and a director were formerly held by the late Henry Tuttle.

Edward L. Stevens, works manager of Spencer Chemical Co.'s Orange, Tex., polyethylene plant, has been named general sales manager of the company. He succeeds **William Schopflin,** who has been appointed assistant to the vice president. **Robert A. Byorum,** formerly chief engineer and construction manager for Spencer with offices in Kansas City, has succeeded Stevens as works manager at Orange. **R. W. Hogeboom,** assistant chief engineer, moves up to chief engineer and construction manager. In other changes, **Robert H. Reid,** product manager, nylon, has been named production specialist in Orange. **Franklin E. Eck,** field sales manager in Kansas City, succeeds Reid. Eck will be replaced by **R. J. Bailey,** Chicago district sales manager. **C. J. Bridgen,** polypropylene product manager, succeeds Bailey in Chicago, and **W. R. Claypoole** has been named polypropylene product manager, succeeding Bridgen.

Gordon E. Davenport, senior chemical engineer at the Texas City research laboratories of Monsanto Chemical Co.'s Lion Oil division, has been appointed group leader.

Henry J. Haas, coordination engineer with Phillips Petroleum Co. in Bartlesville, Okla., has been promoted to supervising project engineer in the gasoline department and transferred to Borger, Tex.

Harry M. Koons, Bechtel Corp., San Francisco, has been assigned as project manager on a field engineering and right-of-way contract for Midwestern Gas Transmission Co.'s Portland, Tenn., to Joliet, Ill., line. Project office is Danville, Ill. **M. P. Boyle** is assistant project manager and **E. C. Elting** is project administrative manager for Bechtel.

Sun Oil Co. has made six appointments to AviSun Corp. and American Viscose Corp. has made five new assignments to the company, a jointly owned subsidiary of Sun and American Viscose. Sun Oil personnel transferred to AviSun include **Carl A. Setterstrom,** formerly assistant director of Sun's research and development division, now assistant to the president of AviSun and director of the commercial development division. **Dr. Edward T. Severs,** staff assistant to the manager of product development in Sun's research and development division, has been named product manager, polymers, in AviSun's commercial development division. **Earl M. Honeycutt,** manager of process development in Sun's research and development division, becomes manager of manufacturing, polymers, for AviSun. Three other Sun men have been named product engineers, polymers, in the commerical development division. They are **Dr. A. Ross Adams,** formerly research chemist with Sun, and **Neil A. Hansen** and **James C. Warren,** formerly chemical engineers.

American Viscose Corp. has named **Nicholas E. Carr,** assistant manager at the Fredericksburg, Pa., plant, manager of manufacturing, film and fiber, for AviSun. **John Adriaz,** supervisor of converter sales in Chicago, has been appointed sales manager, films, for AviSun. **Donald Fiedler,** American Viscose project engineer, will be AviSun product manager, fibers, in the commercial development division. **Robert Ridgway** and **Ralph M. Winters, Jr.,** have been assigned to the film group in commercial development. Ridgway was in American Viscose's market development department and Winters was staff assistant to the marketing director.

John Calligeros, petroleum engineer with Creole Petroleum Corp., has joined Arabian American Oil Co.

R. (Cotton) Makin, formerly president of Makin Drilling Co., Hobbs, N. M., has left contract drilling to become a consultant in Hobbs.

Wayne L. Simpson, junior geologist with Sunray Mid-Continent Oil Co., has been promoted to geologist in Shreveport, La.

Leroy Whitaker, senior research chemist at Jefferson Chemical Co.'s Austin, Tex., laboratories, has been assigned to market development in the commercial development division.

William E. Moore, Jr., vice president and a director of Tejon Ranch Co., has been elected executive vice president. Moore joined the company in 1947 and was named a vice president the next year. He has been manager in charge of oil operations.

K. C. Purgason, district gas engineer in Midland, Tex., for Warren Petroleum Corp., has been named area manager for West Texas and New Mexico natural-gasoline plants. Plants in this area were formerly included with those of East and South Texas under management of **Calvin C. McKee.** Recent expansions in the area brought about the division into two areas. McKee will continue to manage East and South Texas plants. Purgason joined Gulf Oil Corp. in 1949 after graduation from the University of Oklahoma. Gulf's natural-gasoline plants were transferred to Warren last year.

PURGASON

George C. Debney, chief engineer of Magnolia Petroleum Co.'s Beaumont, Tex., refinery, has been promoted to assistant general manager there. He will direct all engineering, maintenance and safety work at the refinery.

Paul S. Hedrick, long-time oil editor of the Tulsa World and now oil consultant for the newspaper, and **Claude V. Barrow,** oil editor of the Daily Oklahoman since 1926, were cited for their contributions to the industry by the Oklahoma Petroleum Association last week. Citations were presented in Bartlesville at a banquet marking the 62nd birthday of Oklahoma's first commercial oil well.

Brockman Heads Illinois Oil and Gas Association

Newly elected president of Illinois Oil & Gas Association is H. L. Brockman, second from left in front row of Calvert Drilling, Inc. Olney, Ill. He succeeds Thomas N. Duncan, third from left, N. V. Duncan Drilling Co., Fairfield, Ill. Other officers named at the association's recent annual meeting are, front row, left to right, J. D. Anderson, Ohio Oil Co., third vice president; Brockman; Duncan; F. F. Farrar, Farrar Drilling Co., secretary. In the second row, left to right, are Walter B. Price, National Associated Petroleum Co., treasurer; C. T. Smith, Flora, Ill., independent, general counsel; Joseph J. Shulman, Shulman Brothers, second vice president; and C. J. Pardee, Mount Vernon, Ill., executive secretary. Not pictured is M. H. Guess, Shell Oil Co., first vice president.

E. B. Shewmake, assistant drilling superintendent, has been promoted to superintendent for Cactus Drilling Corp.

W. B. Rodan, Pan American Petroleum Corp.'s Houston division geologist, has been named district exploration superintendent in Denver.

Elmer V. Kimble, formerly with Rocky Mountain Drilling Co. in Ventura, Calif., has joined Haney-Williams Drilling Corp. as tool pusher in Maceio, Alagoa, Brazil.

Wendell S. Moore, Columbian Carbon Co., Charleston, W. Va., has been elected chairman of the eastern district of American Petroleum Institute's Division of Production. **Robert S. Stewart,** Huntley & Huntley, Pittsburgh, retiring chairman, becomes chairman of the district advisory committee. **J. Robert Hornor,** Delaware Gas Co., has been named secretary-treasurer. Vice chairmen of the eastern district include **L. T. Evans,** East Ohio Gas Co., North Canton, Ohio; **M. H. Flood,** Ohio Oil Co., Terre Haute, Ind.; **H. T. Heuple,** Manufacturers Light & Heat Co., Pittsburgh; **H. J. Magner,** Delta Drilling Co., Pittsburgh; **V. W. Orr,** McClure Oil Co., Alma, Mich.; **Nace Mefford,** Ashland Oil & Refining Co., Ashland, Ky.; **Quentin Wood,** Quaker State Oil & Refining Co., Bradford, Pa.; **Carl Sherman,** Illinois State Geological Survey, Urbana, Ill.; **Earl Linn,** Hiawatha Oil & Gas Co., Pittsburgh; **Byron Maxwell,** United Fuel Gas Co., Charleston, W. Va.; and **Don Hubbard,** Ohio Fuel Gas Co., Columbus, Ohio.

J. K. Drisdale, reservoir engineer in El Campo, Tex., for The Texas Co., has been promoted to district reservoir engineer in Corpus Christi, Tex.

William J. Parsons, assistant division geologist in Midland, Tex., for Texas Pacific Coal & Oil Co., has been promoted to division geologist there. He succeeds **Cecil S. Aycock, Jr.,** who resigned to open consulting offices.

Walter N. Maguire, Maguire & Cole, **Walter L. Maguire,** investment adviser, and **Stanley A. Wickstrom,** vice president of Associated Oil & Gas Co., have been elected directors of Prince Marine Drilling & Exploration Co.

J. S. Noel, superintendent of Transcontinental Gas Pipe Line Corp.'s Westchester, Pa., pipeline district, has been named superintendent of the new Trucksville, Pa., pipeline district. **Wendell Q. Scott,** formerly engineer in the pipeline department, has been named superintendent of the new Thibodaux, La., pipeline district.

▶▶▶ Personals

R. E. Wallace, analytical chemist for D-X Sunray Oil Co., Tulsa, has been promoted to senior analytical chemist.

Milton E. Fox, assistant division engineer in Mattoon, Ill., for Carter Oil Co., has joined Tennessee Gas & Oil Co. in Midland, Tex., as petroleum engineer.

Dr. Orville L. Polly has been promoted to senior research associate at Union Oil Co.'s Brea, Calif., research center. **Dr. Homer E. Rea** has been named senior process engineer, and **Robert D. Doering** has been named senior engineer at Brea.

James M. Bird, vice president of Seismograph Service Corp., has been elected a director. Bird was named vice president in charge of well logging for Seismograph Service in January after the company purchased Birdwell, Inc.

H. Allen Nelson, vice president of Blackwell Oil & Gas Co., and **Burch Williams** of Reinholdt & Gardner, St. Louis, have been elected directors of Blackwell. **A. B. Imel,** a director of the company for 16 years, has retired from the board. He retired as vice president of the company in 1955.

G. A. Wilson, superintendent of natural-gasoline and gas operations in Continental Oil Co.'s Rocky Mountain region, has been promoted to coordinator of natural-gas operations for the company, a new position. He will headquarter in Houston. **James E. Finley,** assistant southwestern region exploration manager, has been promoted

WILSON

FINLEY

to regional manager of exploration. He will continue to headquarter in Fort Worth. Finley succeeds **D. D. Christner,** who retired March 31. Also, Conoco has promoted **F. T. Elliott,** assistant superintendent of the North Texas-Panhandle production division, to division superintendent. He succeeds **G. F. Beekman,** who has retired. Elliott will headquarter in Wichita Falls, Tex.

▶▶▶ Personals

Pat Murta, geologist with Winona Oil Co., has been elected a vice president. **L. A. Payne,** vice president and assistant secretary, has been named vice president and treasurer.

Paul Munk and **James A. Robbers** have been appointed group supervisors in the process and plant design division of California Research Corp.'s Richmond, Calif., laboratory.

Herbert E. Rose, senior reservoir and development engineer for Superior Oil Co., has been transferred to South Pasadena, Calif., from Rio Bravo, Calif.

Gene L. Shaw, formerly with Forest Oil Corp., has joined Monsanto Chemical Co.'s Lion Oil division in Denver as geologist.

A. Rex Hafer, Jr., formerly with Tidewater Oil Co. in Casper, Wyo., has resigned to open consulting geological offices in Billings, Mont.

W. W. Cofield, senior engineer in Transcontinental Gas Pipe Line Corp.'s pipeline department, has been promoted to assistant superintendent of the measurement department.

J. R. Christian has been appointed area exploitation engineer for Canada for Stekoll Petroleum Co. **Otto Van Maerssen** has been named reservoir engineer for Stekoll, and **William Shannon** has been named mechanical engineer. All three will headquarter in Dallas.

R. L. Parsons has been appointed technical assistant in producing technology on the staff of California Research Corp.'s vice president for oilfield research. **D. L. Moore** has been named supervisor of general services at the company's La Habra, Calif., laboratory.

A. C. (Bill) Daley, geologist in Denver for William Ross Cabeen & Associates, has been transferred to Billings, Mont., as head of Montana exploration. **George Darrow,** formerly district manager in Billings, recently resigned to become a consultant.

W. W. Butler, Tidewater Oil Co.'s central division geophysicist in Tulsa, has been transferred to Calgary as district geophysicist there. Butler joined Tidewater in Houston in 1945. He had been with Superior Oil Co., Gulf Research & Development Co., Barnsdall Oil Co., and Geophysical Research Corp. before that time. He is a graduate of the University of Colorado.

Roy C. Williamson, Jr., engineering trainee with Gulf Oil Corp. in Odessa, Tex., has been promoted to petroleum engineer and transferred to Monahans, Tex.

Maynard C. Wheeler, senior vice president of Commercial Solvents Corp., has been elected president. **Jeremiah Milbank, Jr.,** a director, has been named chairman of the board's executive committee, and **William S. Leonhardt,** treasurer, has been named financial vice president and treasurer.

▶▶▶ Deaths

Zach Brooks, 66, partner in Zach Brooks Drilling Co., El Dorado, Ark., died April 10 in Macon, Miss., after a heart attack. Brooks was hospitalized by an earlier attack 10 days before his death. He was planning to return to El Dorado when he suffered the second attack. The Brooks company brought in the discovery well in Alabama's Citronelle field in 1955. Brooks entered the oil industry with Pure Oil Co. in the boom days of Arkansas' Smackover field.

Floyd F. Carr, 51, Shreveport, La., district manager for Dowell division of Dow Chemical Co. since 1950, died April 9. Carr had been with Dowell since 1939. He was a graduate of Colorado School of Mines.

Walter Lee Church, Sr., 70, founder and retired chairman of Pioneer Well Tools, Inc., Houston, died April 9 while returning from a pleasure cruise in the Caribbean area. Church founded Pioneer Well Tool in 1945. He held more than 60 patents for inventions in oil field equipment. He retired as Pioneer chairman in 1954.

Dudley P. South, Sr., 61, Houston independent operator, died April 9 in a Houston hospital after a long illness.

T. E. Davie, 53, geological coordinator for Amerada Petroleum Corp., died April 12 at his home in Tulsa from head injuries suffered in a fall. Davie joined Amerada in 1932 after graduation from the University of Oklahoma.

J. N. McFarland, 58, Long Beach and Kern County, California, oil producer, died April 11 in a Long Beach hospital after an illness of 6 months.

Marion E. Brock, 73, retired Gulf Oil Corp. executive, died April 8 at his home in Houston after a long illness. Brock entered the oil business with J. M. Guffey Petroleum Co. of Beaumont, Tex., a forerunner of Gulf. He was active in early anti-pollution efforts and helped put into operation the first salt-water disposal plant in East Texas field. He served for many years as chairman of the American Petroleum Institute's committee on disposal of production wastes. He retired in 1951 after 38 years with Gulf companies.

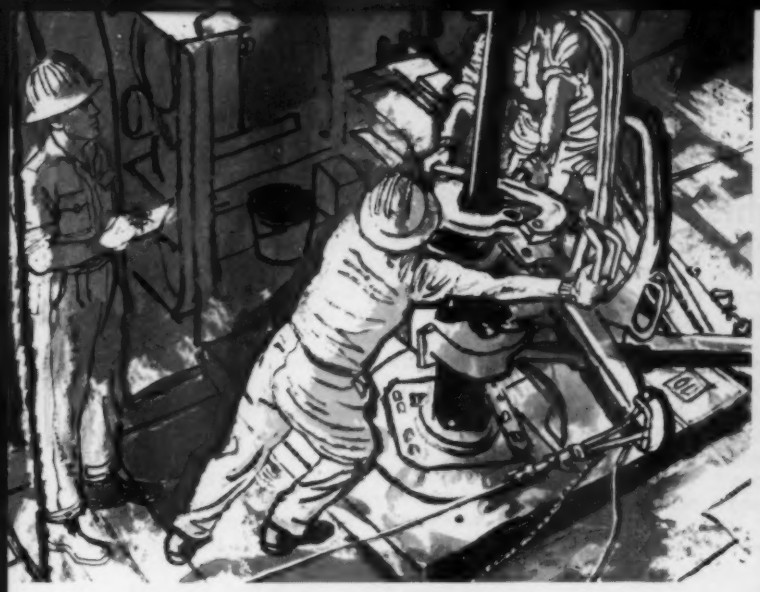
W. C. (Bill) Wenzel, 57, former executive manager of Pennsylvania Grade Crude Oil Association, Oil City, Pa., died April 13 in New York of a heart attack. Wenzel was assistant treasurer of Richfield Oil Corp. of New York before joining the Penn Grade association. He left the association last year after 14 years as executive manager.

J. M. Hamer, 57, general manager for administrative operations, Standard Oil Co. (Ind.), died April 10 in Chicago.

Norman Windsor (Shot) Hendershot, 80, pioneer California and Texas oil equipment supplier, died April 10 in Santa Monica, Calif., after a brief illness. Hendershot became manager of National Supply Co. in Beaumont, Tex., in 1901. In 1910 he went to Los Angeles as manager for Oil Well Supply Co. He later founded the old Buckeye Union Oil Co. and operated his own supply firm in Coalinga, Calif., for 27 years. He retired in 1950.

Ed H. Samuel, 64, Tyler, Tex., independent operator, died April 3 after a heart attack. Samuel was with Magnolia Petroleum Co. in the 1920's before becoming an independent in 1932.

Lynn B. Hamilton, Sr., 79, retired independent operator in Houston, died April 11 after a 2-year illness. He retired in 1950.



How safe is your rig? A Liberty engineer can check your rig for accident hazards, help you establish safe operating procedures. Fewer accidents on the job mean fewer man-hours lost, lower costs. Your operations aren't interrupted – you save time and money.

New ways Liberty Mutual provides

Protection in depth

to safeguard your people... to cut workmen's compensation insurance costs

A series of bad accidents or losses can drive your compensation insurance costs up fast. At Liberty Mutual, we believe it is our job to help you prevent this. That is why we make available to our policyholders an unusually broad range of services and resources.

We call this protection in depth. You see some of its resources on this page. There are many others. They are backed by the experience and dollars of the largest private writer of compensation insurance.

Now, oil-well drillers can get this same protection in depth from Liberty in a special four-way protection plan. In addition to workmen's compensation coverage, this plan provides rig coverage, fleet coverage for your company trucks and cars and general liability coverage.

Liberty's protection in depth can be yours today. Call our nearest branch office and ask about our new four-way plan for oil-well drillers.

Look for more from

LIBERTY MUTUAL

...the company that stands by you

Learning the right way to fight fire. Liberty engineers can recommend correct firefighting equipment, show you how to use it, help you check for fire hazards. By cutting down on fire loss, hundreds of our policyholders have cut insurance costs.

New life . . . new job. As part of its rehabilitation program, Liberty works to retrain injured employees of policyholders. Men are interviewed and given IQ tests. Some are even sent to school to acquire new skills. Goal – to place rehabilitated persons in jobs that best suit them.

LIBERTY MUTUAL INSURANCE COMPANY • LIBERTY MUTUAL FIRE INSURANCE COMPANY • HOME OFFICE: BOSTON
Types of insurance: Automobile, Homeowners', Liability, Group Accident and Health, Fire, Workmen's Compensation, Marine, Crime

A quick look at the highlights . . .

	LATEST WEEK	Change from WEEK AGO		Change from YEAR AGO	
Production	7,142,750	DOWN	1,775	DOWN	900,385
Crude stocks	252,388,000	DOWN	1,970,000	DOWN	29,267,000
Completions	845	DOWN	6	UP	111
Refinery runs	8,092,000	DOWN	107,000	UP	598,000
Gasoline stocks	214,594,000	UP	979,000	UP	808,000
Kerosine stocks	19,281,000	UP	665,000	UP	1,875,000
Distillate stocks	78,994,000	UP	43,000	UP	5,267,000
Residual stocks	57,393,000	DOWN	1,488,000	UP	431,000
Four-product stocks	370,262,000	UP	199,000	UP	8,381,000
Total imports	1,405,600	DOWN	864,600	DOWN	182,400

Give the refiner his due

BY JOHN C. CASPER

DON'T HIT below the belt. Some low blows have been aimed at the refiner recently in the form of misleading stock comparisons. Of course, the refiner has tagged himself on the chin a few times, but he should not be charged with that part of a poor stock comparison which results from corrections he made last year.

Here is the comparison that has been used in recent weeks to show that the refiner has not been paying attention to the national supply-demand balance.

At the end of December, the stock total for four major products was about 38 million barrels less than at the same time the year before. This relative position held until the end of January. But by the end of February the stock drop was down to 13 million barrels. At the end of March the four-product stock total was actually above last year by more than 2 million barrels.

These figures show that the industry stock position shifted from a minus 38 million barrels to a plus 2 million within a period of 2 months. This represents a net shift in stock position of about 40 million barrels. These are facts, based on statistics reported by the Bureau of Mines and the American Petroleum Institute.

But, not all of this shift should be charged against refinery operations this spring. Part of it was due to the heavy reduction in product stocks in the first quarter last year.

The drop in stocks last year came through planned refinery runs and cold weather. February was a very cold month. Domestic demand for middle distillate showed an increase of 27% over February 1957. Major product inventories dropped 34 million barrels. The big reduction was followed by a drop of 10.5 million barrels in March.

This stock cut of 44.5 million barrels in February and March of last year was due in part to the cold weather. But, control of refinery runs also was a factor.

Runs for February 1958 averaged 7,524,000 bbl. daily or about the same as reported for February 1955. The total was 800,000 bbl. daily lower than for February 1956 and 600,000 bbl. daily below February 1957.

There was a definite program started in the early months of 1958 to reduce product inventories through cuts in refinery runs. The program was successful and lasted throughout most of the year.

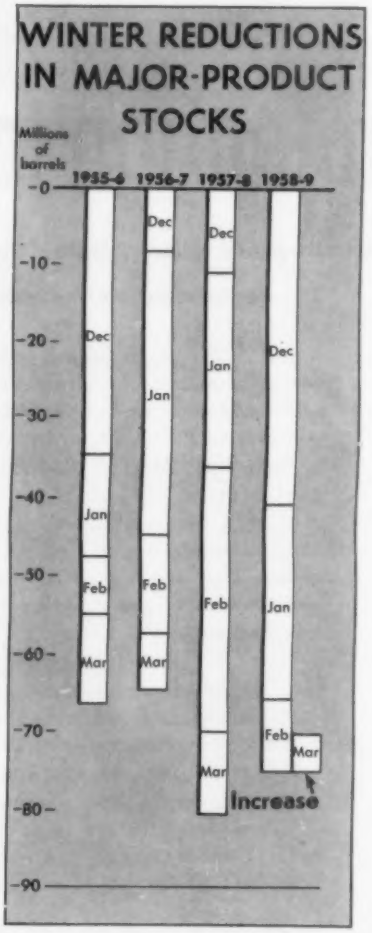
This plan was a factor in the stock drop reported for the first quarter of last year. It was an important influence in the stock reduction of 44.5 million barrels in the February-March period. The average reduction for this period in other recent years has been between 15 and 20 million barrels.

Four-product stocks decreased only 9 million barrels in February this year and actually increased about 5 million barrels in March. The net decrease was only 4 million barrels for the period.

The refiner gets at least one black eye when this 4-million-barrel reduction is compared with the normal drop of 15 to 20 million barrels for the February-March period. However, it is a low blow to compare the 4 million barrels with the abnormal 44.5 million barrels taken out of storage in the same period last year.

Mr. refiner is having his troubles. Stocks are high and markets are weak. He ran better than 8 million barrels daily in March, the highest March on record. He tanked 5 million barrels of major products. He has 56 million barrels more products than he needs, according to his report to the Texas Railroad Commission. He will have to make sharp cuts in runs and hold the low level for several months.

He has his faults, but give him credit for the good job he did in reducing stocks last year.

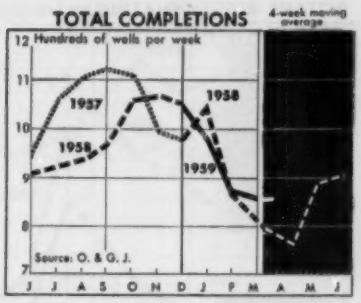


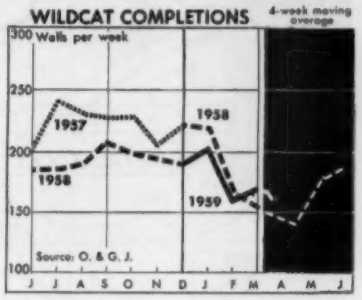
PRODUCT STOCK REDUCTIONS were better than normal for December and January last winter but were below average for February. Stocks increased in March, the first time since 1946.

Active Rotary Rigs

	4-13-59	4-6-59	4-14-58
Alabama	7	7	5
Arkansas	13	13	15
Arizona	1	1	0
California	98	95	65
Land	96	93	(†)
Offshore	2	2	(†)
Colorado	39	33	25
Florida	3	3	1
Land	2	2	1
Offshore	1	1	0
Illinois	32	23	35
Indiana	10	10	6
Iowa	3	3	3
Kansas	136	136	109
Kentucky	7	8	3
Louisiana	332	334	300
North	36	36	38
S.-Inland waters	145	142	(‡)
S.-Land	107	115	211
Offshore	44	41	51
Michigan	15	17	8
Mississippi	69	61	37
Montana	21	20	23
Nebraska	28	17	13
New Mexico	112	100	110
New York	1	1	1
North Dakota	43	47	37
Oklahoma	238	238	195
Pennsylvania	11	9	11
South Dakota	2	2	0
Texas	744	768	727
S.-Inland waters	9	10	(‡)
S.-Land	156	177	177
Offshore	1	1	5
North-East	152	151	(†)
West Central	271	273	(†)
West	155	156	(†)
Utah	32	36	32
Washington	0	0	2
West Virginia	4	5	4
Wyoming	56	50	43
Total U. S.	2,057	2,037	1,810
Western Canada	121	132	84
Eastern Canada	0	0	1
Grand total	2,178	2,169	1,895

*Hughes Tool Co. †Comparisons not available due to change in method of reporting. ‡Included in South-Land.





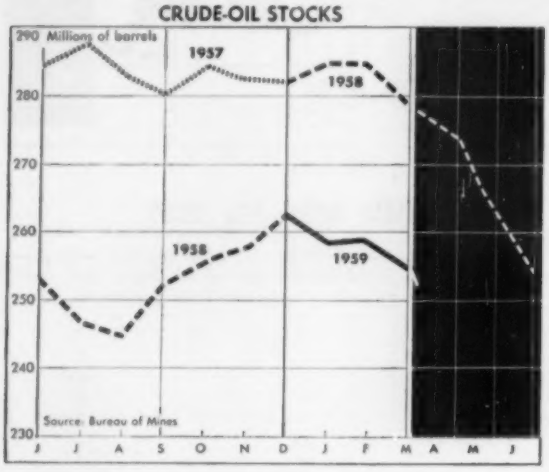
WEEKLY WELL COMPLETIONS . . . WEEK ENDED APRIL 11, 1959

	Total wells							Cum.		Total wildcats					Cum.	
	Total	Crude	Cond.	Gas	Dry	Service	Footage	1959	1958	Total	Crude	Cond.	Gas	Dry	1959	1958
Alabama	1	1	0	0	0	0	11,490	30	20	0	0	0	0	0	5	7
Arkansas	11	9	0	1	1	0	32,209	245	184	1	0	0	0	1	42	45
California	27	18	0	2	7	0	102,297	417	541	5	1	0	1	3	101	102
Colorado	12	3	0	0	9	0	65,901	200	206	9	1	0	0	8	118	107
Illinois	16	8	0	0	8	0	37,099	565	510	3	0	0	0	3	93	104
Indiana	8	2	0	0	6	0	12,464	174	181	1	0	0	0	1	56	65
Kansas	77	37	1	1	34	4	264,983	1,109	1,062	14	0	0	0	14	246	206
Kentucky	18	9	0	2	7	0	32,477	431	235	0	0	0	0	0	47	31
Louisiana	53	29	7	5	12	0	454,220	973	924	4	0	0	0	4	126	123
North	17	9	0	3	5	0	66,983	351	324	2	0	0	0	2	58	50
South	28	16	5	1	6	0	295,392	515	476	2	0	0	0	2	64	67
Offshore	8	4	2	1	1	0	91,845	107	124	0	0	0	0	0	4	6
Michigan	9	3	0	0	6	0	32,348	149	96	3	0	0	0	3	46	35
Mississippi	15	7	0	0	8	0	129,497	182	113	8	1	0	0	7	84	57
Montana	5	2	0	0	3	0	24,276	74	111	2	0	0	0	2	31	51
Nebraska	15	4	0	0	11	0	91,095	202	193	7	0	0	0	7	91	90
New Mexico	49	34	2	7	6	0	195,340	490	573	2	0	0	0	2	47	84
New York	0	0	0	0	0	0	0	97	155	0	0	0	0	0	8	13
North Dakota	10	6	0	0	4	0	63,864	122	115	0	0	0	0	0	28	39
Ohio	22	12	0	5	4	1	54,095	257	261	2	2	0	0	0	7	3
Oklahoma	111	58	4	7	41	1	424,691	1,615	1,921	13	0	0	2	11	250	250
Pennsylvania	0	0	0	0	0	0	0	114	32	0	0	0	0	0	3	6
Texas	357	204	12	12	109	20	1,494,361	5,223	5,144	53	5	1	0	47	997	1,074
District 1	22	11	0	2	9	0	53,465	336	265	6	0	0	0	6	89	103
District 2	16	6	2	0	8	0	95,087	205	183	5	1	0	0	4	63	48
District 3	25	9	2	0	14	0	204,960	285	352	3	0	0	0	3	74	64
District 4	19	10	1	2	6	0	89,826	328	341	1	0	0	0	1	90	102
East	19	10	2	0	7	0	86,718	304	357	4	0	0	0	4	68	100
District 7-B	55	28	0	1	25	1	164,700	719	668	16	3	0	0	13	194	195
West	92	67	1	0	12	12	433,610	1,641	1,545	7	1	0	0	6	192	232
District 9	67	30	1	4	26	6	202,492	1,003	1,063	9	0	0	0	9	192	200
District 10	42	33	3	3	2	1	163,503	402	370	2	0	1	0	1	35	30
Utah	8	4	0	0	4	0	45,396	107	129	3	0	0	0	3	29	22
West Virginia	12	1	0	11	0	0	30,809	203	201	0	0	0	0	0	6	7
Wyoming	8	5	0	1	2	0	41,157	232	231	1	0	0	0	1	78	73
Misc. (Fla.)	1	0	0	0	1	0	10,011	21	33	1	0	0	0	1	17	27
Total U. S.	845	456	26	54	283	26	3,650,080	13,232	13,171	132	10	1	3	118	2,556	2,621
Prev. week	851	452	21	48	307	23	3,395,365	.....	.....	146	9	3	6	128	.....	.....
Cum. 1959	13,232	6,703	340	903	4,926	360	55,859,804	.....	.....	2,556	264	35	85	2,172	.....	.....
Western Canada	48	19	0	6	22	1	283,708	704	725	21	3	0	3	14	269	280

PRODUCTION

ROTARY RIGS OPERATING IN UNITED STATES

CRUDE-OIL STOCKS



CRUDE-OIL STOCKS BY STATES OF ORIGIN*

(Thousands of barrels)

	4-4-59	3-28-59	4-5-58
Pennsylvania	2,524	2,539	2,850
Other Appalachian	1,547	1,475	1,544
Illinois, Indiana, Michigan	8,568	8,599	9,802
Nebraska and North Dakota	2,181	2,202	2,508
Kansas	8,611	8,540	9,576
Oklahoma	17,135	17,563	17,957
Arkansas	1,847	2,025	2,664
Louisiana	18,041	18,190	17,939
North	3,272	3,176	3,092
South	14,769	15,041	14,847
Mississippi, Alabama, Florida	2,421	2,369	2,710
New Mexico	8,351	8,483	8,184
Texas	109,439	109,899	127,232
East Texas	9,427	9,443	8,351
West Texas	52,782	54,103	56,695
Texas Gulf	17,946	17,229	26,456
Other Texas	29,284	29,124	35,750
Wyoming	13,330	13,516	16,155
Other Rocky Mountain	9,238	9,407	7,016
California	34,468	34,494	38,937
Foreign	14,687	15,057	16,581
Total	252,388	254,358	281,655

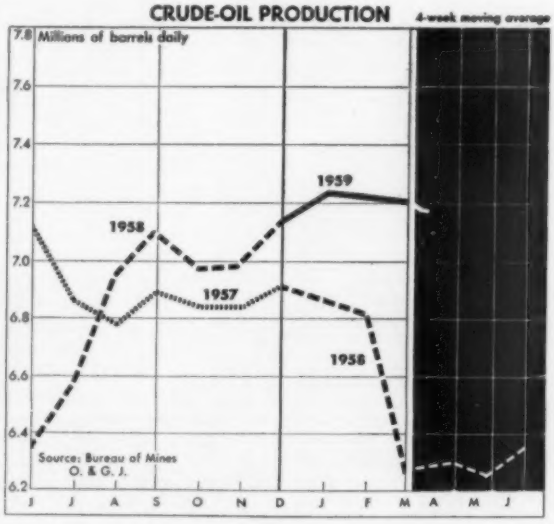
*Bureau of Mines. Includes 5,057,000 bbl. in California.

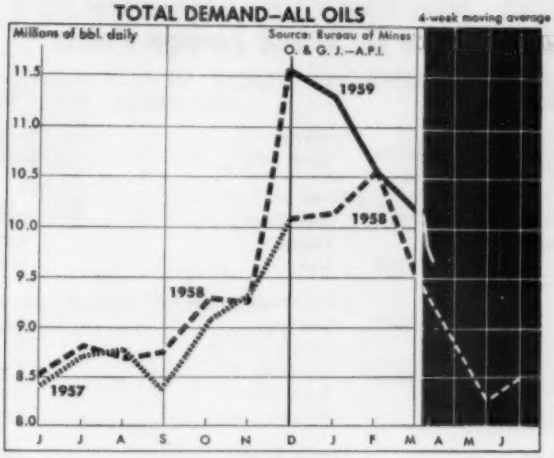
DAILY AVERAGE PRODUCTION FOR WEEK

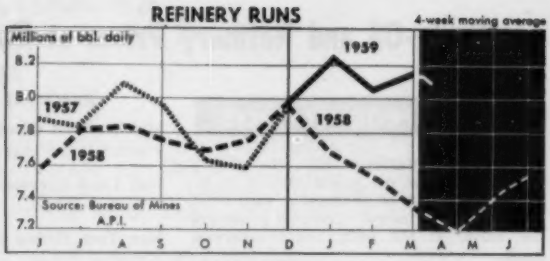
	April 11, 1959 Crude oil	Lease condensate	Total	April 4 total
Alabama	16,300	.....	16,300	16,250
Arkansas	80,300	150	80,450	80,400
California	840,200	.....	840,200	837,700
Colorado	129,000	.....	129,000	129,200
Eastern	42,000	.....	42,000	41,600
Florida	1,300	.....	1,300	1,175
Illinois	221,700	.....	221,700	222,300
Indiana	32,900	.....	32,900	31,600
Kansas	†343,980	.....	†343,980	†325,940
Kentucky	64,100	.....	64,100	64,400
Louisiana	855,500	110,200	965,700	961,875
North	110,500	4,200	114,700	114,600
South	745,000	106,000	851,000	847,275
Michigan	24,500	.....	24,500	23,700
Mississippi	118,250	4,660	122,910	121,760
Montana	81,700	.....	81,700	81,200
Nebraska	56,400	.....	56,400	59,900
Nevada	100	.....	100	100
New Mexico	289,500	5,100	294,600	293,175
North Dakota	37,000	.....	37,000	37,500
Oklahoma	†571,100	.....	†571,100	†550,500
Texas	2,700,000	72,100	2,772,100	2,813,825
Dist. 1	44,000	3,400	47,400	46,825
Dist. 2	114,000	7,800	121,800	124,100
Dist. 3	360,000	34,000	394,000	401,425
Dist. 4	194,000	8,800	202,800	206,225
Dist. 5	31,000	400	31,400	31,975
Dist. 6	120,000	7,000	127,000	128,725
East Texas Field	153,000	.....	153,000	156,425
Dist. 7-B	145,000	150	145,150	145,150
Dist. 7-C	128,000	3,650	131,650	134,500
Dist. 9	1,100,000	4,000	1,104,000	1,123,425
Dist. 9	204,000	2,000	206,000	207,150
Dist. 10	107,000	900	107,900	107,900
Utah	106,000	.....	106,000	111,900
Wyoming	338,600	.....	338,600	338,400
Others	110	.....	110	‡125
Total U. S.	6,950,540	192,210	**7,142,750**	7,144,525
Change from prev. week, down	.....	.....	**1,775**	.....
Canada	†430,600	.....	†430,600	†462,600
Total U. S. production—Jan. 1-April 11	.....	.....	727,217,380 bbl.	
Same period last year (crude plus cond.)	.....	.....	*666,973,640 bbl.	

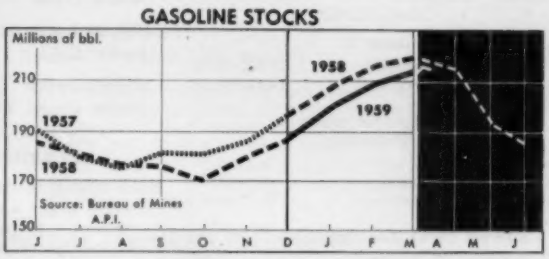
*Includes 16,611,075 bbl. condensate. †Week ended previous Monday. ‡South Dakota and Washington.

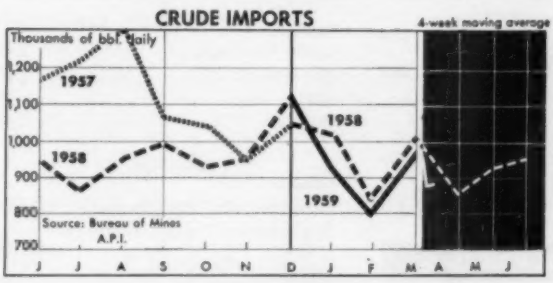
CRUDE-OIL PRODUCTION

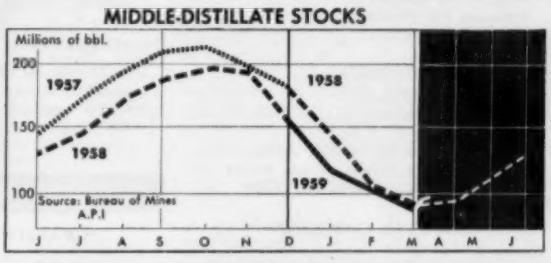


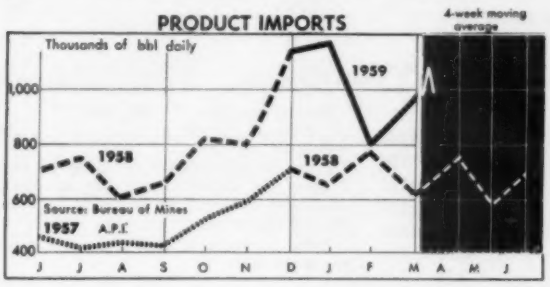


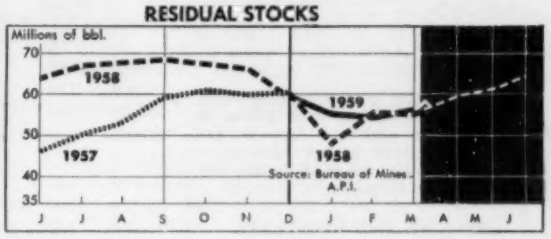












API REFINERY REPORT—APRIL 10, 1959

(Thousands of barrels)

District—	Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.	Stocks‡ Gaso.†	Kero.	Dist.	Resid.	Bureau of Mines, April 1958 Daily avg. runs	Daily average production Gaso.*	Kero.	Dist.	Resid.
East Coast	1,159	542.0	41.1	343.4	199.4	47,744	7,894	27,642	13,971	1,079	454.3	35.1	291.3	162.4
Appalachian:														
Dist. 1	81	35.6	1.7	20.0	7.3	4,769	420	1,613	206	82	32.2	2.9	20.4	7.4
Dist. 2	79	43.0	6.1	15.2	9.4	2,576	314	898	257	87	46.4	5.0	17.3	7.6
Ind., Ill., Ky.	1,557	787.3	66.0	323.9	170.7	40,019	3,451	10,790	3,204	1,286	643.4	59.4	256.3	142.5
Minn., Wis., Dak.	111	55.1	5.6	29.3	13.3	6,590	518	2,969	437	102	48.8	7.0	26.7	9.0
Okla., Kans., Mo.	697	355.4	16.1	165.9	13.4	21,647	859	6,432	965	637	345.1	15.7	143.5	23.5
Inland Texas	236	173.7	9.3	33.3	20.9	7,714	350	1,177	2,174	262	186.5	7.7	50.9	16.8
Texas Gulf Coast	1,897	979.4	98.3	454.9	192.0	29,166	2,756	8,126	5,753	1,673	829.0	85.6	405.4	195.0
La. Gulf Coast	702	350.4	36.3	145.6	39.9	11,768	1,410	4,684	1,211	585	333.7	39.8	140.6	38.0
N. La. and Ark.	100	49.0	5.0	20.9	4.6	4,997	591	1,593	129	114	52.7	5.6	24.2	7.1
Rocky Mountain:														
New Mexico	20	10.3	0.3	2.9	1.4	630	27	136	7	30	16.6	0.6	4.5	3.5
Other Rky. Mt.	277	131.2	4.3	58.7	34.7	7,476	253	2,527	1,104	223	101.4	0.9	50.7	26.4
West Coast	1,176	525.9	10.9	186.3	262.7	29,498	438	10,407	27,975	1,030	468.4	4.8	135.9	307.9
Apr. 10, 1959	8,092	4,038.3	301.0	1,800.3	969.7	214,594	19,281	78,994	57,393	7,190	3,558.5	270.1	1,567.7	947.1
Apr. 3, 1959	8,199	4,057.9	312.0	1,969.1	971.1	213,615	18,616	78,951	58,881	.....	.....	.....	.....	.....
Apr. 11, 1958	7,494	3,688.1	290.1	1,674.3	1,021.1	213,786	17,406	73,727	56,962	.....	.....	.....	.....	.....

*At refineries including natural blended. †Finished and unfinished. ‡At refineries, bulk terminals, in transit, and in pipelines.

Crude-Oil and Refinery Prices at Representative U. S. and Foreign Points

REFINED-PRODUCT PRICES

Following quotations are for refinery products in cents per gallon moving in interstate shipments on Wednesday each week unless otherwise noted. Crude-oil prices are per barrel at the wells unless otherwise listed.

GASOLINE*

Mid-Continent (Group 3):

Regular (89 octane)	11.625-12.00
Premium (99 octane)	14.625-15.00

Gulf Coast (cargoes for coastwise or export movements):

★ Regular (90 octane)	10.25-10.50
★ Regular (92 octane)	10.50-10.75
★ Premium (98 octane)	11.75-12.00

California (rack) (Los Angeles):

Regular (88 octane)	12.65
Premium (94 octane)	13.65
Premium (98 octane)	14.65

Caribbean area (cargoes):

★ Regular (87 octane)	10.125
★ Premium (97 octane)	11.875

*Quotations are for octanes shown. Prices usually vary with octane ratings within the regular, premium, and aviation grades.

NATURAL GASOLINE*

Group 3:

Grade 26-70	4.5

Breckenridge:

Grade 26-70	4.0

*If 26-70 natural is considered as 100%, prices for lower-vapor-pressure grades increase 2.5% for each unit drop in Reid vapor pressure down to and including 16 lb. Prices for grades below 16 lb. may vary slightly by areas or plants.

KEROSINE AND DISTILLATE

Mid-Continent (Group 3):

Kerosine 42-44	10.50-10.75
Diesel oil (58 d.i. and above)	10.25-10.50
Distillate No. 1	10.25-10.50
Distillate No. 2	9.50-9.75

Gulf Coast (cargoes):

★ Kerosine 41-43	9.875
★ Distillate No. 2	9.375

New York Harbor (barges):

Kerosine 41-43	11.00
Distillate No. 2	10.50
Diesel fuel, 48-52 d.i.	10.75

Caribbean area (cargoes):

★ Distillate No. 2	9.625

WAX (LB.)

Oklahoma (Group 3):

132-135 A.m.p. (semi-refined) in tank car	6.50

New York (export):

126-130 A.m.p. crude-scale (solid in bags or barrels)	7.35

★Denotes change from previous week.

RESIDUAL FUEL (BBL.)

Mid-Continent (Group 3):

★ Residual fuel (max. 1% S)	$1.85-2.00

Gulf Coast (cargoes):

Bunker C fuel	$2.00

New York Harbor (barges):

Bunker C fuel	$2.37

Caribbean (cargoes):

Bunker C	$2.00

California (rack):

Bunker C fuel, Los Angeles	$2.15

LUBRICATING OILS

Mid-Continent (Group 3):

150-160 bright stock, solvent refined, 0-10 pp., 95 v.i.	23.0
200 vis. neutral oil, solvent refined, 0-10 pp., 95 v.i.	20.5

Pennsylvania Grade:

145-155 vis. at 210, bright stock, 8 color, 25 p.t.	22
200 vis. neutral (180° at 100°), 25 p.t.	21

CRUDE-OIL PRICES

GRAVITY SCHEDULE

	Signal Hill, Calif.	Oklahoma	Gulf Coast Tex.*	West Tex.† N.M.	Wyo. (sour)
14-14.9	$1.86	....	....	....	....
15-15.9	1.95	....	....	....	$1.81
16-16.9	2.04	....	....	....	1.86
17-17.9	2.13	....	....	....	1.91
18-18.9	2.23	....	....	....	1.96
19-19.9	2.32	....	....	....	2.01
20-20.9	2.41	$2.49	....	$2.35	2.06
21-21.9	2.50	2.52	....	2.38	2.11
22-22.9	2.60	2.55	....	2.41	2.16
23-23.9	2.69	2.58	$3.44	2.44	2.21
24-24.9	2.78	2.61	3.46	2.47	2.26
25-25.9	2.84	2.64	3.48	2.50	2.31
26-26.9	2.90	2.67	3.50	2.53	2.36
27-27.9	2.95	2.70	3.52	2.56	2.49
28-28.9	3.01	2.73	3.54	2.59	2.54
29-29.9	3.07	2.76	3.56	2.62	2.59
30-30.9	3.12	2.79	....	2.65	2.63
31-31.9	3.20	2.82	....	2.68	2.67
32-32.9	3.27	2.85	....	2.71	2.71
33-33.9	3.34	2.88	....	2.74	2.75
34-34.9	3.41	2.91	....	2.77	2.79
35-35.9	3.47	2.94	....	2.80	2.83
36-36.9	3.52	2.97	....	2.83	2.87
37-37.9	3.56	2.99	....	2.86	2.89
38-38.9	....	3.01	....	2.89	2.91
39-39.9	....	3.03	....	2.92	2.93
40-40.9	....	3.05	....	2.95	2.95

*Low cold test crude. †Sour.

Effective dates of broad changes: California, 1-26-59; East of California, January 3-10, 1957; Pennsylvania Grade 4-1-59.

FLAT PRICES

Louisiana:

Sweet Lake	$3.00

Texas:

East Texas	3.25
Conroe	3.53
Van	3.08

Pennsylvania Grade:

Bradford	4.15
Middle District	3.97
Southwest Pennsylvania	3.70
West Virginia	3.57
Buckeye Grade	3.25

Illinois Basin	**3.00**

Canada:

Leduc-Woodbend	2.53
Redwater (Alta.)	2.42
Smiley (Sask.)	2.18
Pembina	2.38

FOREIGN

Venezuela:

Cumarebo, 48°-49.9°, Tucupido	3.34
San Joaquin, 41°-41.9°, Puerto La Cruz	3.08-3.10
Oficina, 35°-35.9°, Puerto La Cruz	2.80
Tia Juana medium, 26°-26.9°, Amuay*	2.30
Quiriquire, 16.0°-16.4°, Caripito	2.10
Lagunillas heavy, flat, Las Piedras*	**2.10**
Bachaquero, flat, 15°-16°, Las Piedras*	1.88

Prices for all crudes of 24° or lighter vary 2 cents per degree change, up or down. All crudes heavier than 24° vary 2.5 cents per half-degree gravity change.

*Also available at La Salina at 3 cents per barrel less.

Middle East, Persian Gulf (cargoes f.o.b. lifting port):

Arabian, about 34°, Ras Tanura	$1.89
Iranian, 34.0°-34.9°, Bandar Masur	1.86
Iranian, 34.0°-34.9°, Abadan	1.81
Iraq, 36.0°-36.9°, Fao	1.82
Kuwait, 31.0°-31.9°, Mina-al-Ahmadi	1.67
Qatar, about 41°, Um Said	2.05

Middle East, E. Mediterranean:

Arabian, about 35°, Sidon	2.29
Iraq, about 35°, Tripoli, Banias	2.29

Far East (cargoes, f.o.b. Lutong, Sarawak):

Seria Light, 37°	2.57

TANKER RATES PER LONG TON

(Latest reported spot fixtures)

★ Gulf-U.S.N.H., clean (USMC —42.5%)	1.64
★ Carib.-U.S.N.H., dirty (ATRS —70%)	0.83
★ P.G.-Portland, dirty (Scale—72.5%) (22s. 10d.)	3.20
★ L.A.-N.Y., dirty (ATRS—46%)	3.62

Technical-Engineering Textbooks

FOR YOUR WORKING LIBRARY

Here is your chance to make additions to your library of popular technical texts. These books are not published by The Oil and Gas Journal, but are offered to you through the Reader Service Department. Look the list over, pick out those that you want and send your order on the blank provided.

"OIL PROPERTY VALUATION"
Paul Paine **$5.50**

Discusses oil properties and oil property interests. Covers unproved lands . . . oil and gas reserves . . . elements in valuation . . . valuation methods. Definitions and explanation make this book useful. 204 pages.

"STRUCTURAL GEOLOGY"
L. U. De Sitter **$11.00**

In one volume — the latest methods, experimental techniques and data, and principles covering every phase of structural geology. Describes in detail the development and characteristics of every kind of structural formation. 552 pages. 411 illustrations.

"ELEMENTS OF OIL RESERVOIR ENGINEERING"
S. J. Pirson **$14.00**

Develops and coordinates the principles which govern the behavior of geological petroleum reservoirs. Includes the concepts of the three fundamental equations of reservoir engineering. 441 pages.

"PETROLEUM REFINERY ENGINEERING"
W. L. Nelson **$15.00**

New Edition—Gives step-by-step presentation of refining methods—practical details on plant operations. Some of subjects covered are: catalytic cracking, solvent treating, sulfur compounds, ethlyene manufacture, additive materials, reboiling, etc. 960 pages, 257 tables, 340 illustrations. 4th Edition.

"HOW OIL IS FOUND"
Ver Wiebe **$8.50**

Suited to needs of oil operators, lease operators, drilling contractors, tax consultants. Includes seepages, oil rocks, structure, oil accumulation. Describes oil finding techniques fully. 247 pages, 312 illustrations.

"PRACTICAL OIL GEOLOGY"
Hager **$9.00**

New 6th edition. A clear, concise, practical book covering the fundamentals of geology—methods for searching untested areas, selection of sites, application of geology in drilling. This edition carries a section of Veatch's Rule. 589 pages, 227 illustrations, 78 tables.

"STRUCTURAL GEOLOGY OF NORTH AMERICA"
A. J. Eardley **$13.50**

Detailed description of the structural evolution of the North American continent. Double-column pages, 11¼" x 8¼", permit large drawings. Some 750 illustrations and 16 paleotectonic maps in full colors. 620 pages.

"FIELD GEOLOGY"
Frederic H. Lahee (5th edition) **$9.75**

A complete manual for petroleum and mining engineers and geologists. Presents methods and keys for recognition and interpretation of land forms and structures. Valuable new information on air photography and air photogrammetry . . . underground surveying . . . electronic location. 883 pages, 5" x 7". 630 illustrations.

"NORTH AMERICAN PETROLEUM"
Ver Wiebe **$12.00**

The new revised and up to date 1957 edition is now ready. Contains discussion of each oil and gas area in the U. S. and Canada.—Full description of rocks—structure of the rocks—producing zones—oil traps, etc. The concluding chapter gives same data for the oil fields of the Middle East. 495 pages—8½ x 11—Many maps, cross sections and electric logs.

"INTRODUCTION TO GEOPHYSICAL PROSPECTING"
Milton B. Dobrin **$9.00**

A practical treatment of the fundamentals, procedures, uses, and values of all the standard methods of geophysical prospecting. For each method discussed, the book covers basic physical principles, instrumentation, field techniques, reduction and interpretation of field data. 435 pages, 65 illustrations.

"FUNDAMENTALS OF RESERVOIR ENGINEERING"
John C. Calhoun, Jr. **$6.95**

A discussion of the application of engineering principles to various phases of reservoir engineering. Arranged in topical order are such subjects as Reservoir Fluids; Reservoir Rocks and Rock-Fluid Systems; Reservoir Principles—Gas Flow, Drainage and Water Influx; and Well Performance Applications. Collected from a series which appeared in The Oil and Gas Journal. 417 pages, 288 diagrams and graphs.

Title of Book	Price
.....	$ .....
.....	$ .....
.....	$ .....
.....	$ .....
Total of Order	$ .....

..... Payment enclosed ..... Purchase order enclosed ..... Mail invoice
(Make Checks payable to The Oil and Gas Journal)

Name .....

Address .....

City ..... Zone ..... State .....

Reader Service Department
THE OIL AND GAS JOURNAL
P. O. Box 1260 Tulsa 1, Okla.

CLASSIFIED ADVERTISING

. . . your market place for the oil and gas industry

RATES:
UNDISPLAYED CLASSIFIED 26c a word one issue. 10% discount three or more consecutive issues. $5.00 minimum charge. Blind Box in our care nine words. Payable in advance.

DISPLAY CLASSIFIED
$18.00 a column inch one issue . . . 10% Discount three or more consecutive issues.

Address Classified Advertising Material: The Oil and Gas Journal, P. O. Box 1260, Tulsa 1, Okla.

EXCEPT . . .
WESTERN STATES: (California, Washington, Oregon, Idaho, Nevada, Utah, and Arizona) Write: Classified Departments, Inc., The Oil and Gas Journal, 4041 Mariton Ave., Los Angeles 8, Calif. Phone: AXminister 2-0287.

FOR SALE EQUIPMENT

1500 FAILING, drill pipe, water truck, Star 71. Drilling Service core barrel, 3½ x 20. Fred Butler, Box 481, Pueblo, Colo.

WELL DRILLS - CORE DRILLS. Everything for well and core drilling in both new and used equipment at money saving prices. Fishing tools rented. Send for bulletins. Pressey & Son, Pueblo, Colo.

FOR SALE—Complete refining units, Skimmer, Thermal Cracker, Debutanizer, Depropanizer, and other good equipment. J. C. Hinds—Box 632, Palestine, Texas, Day Phone LE 8-2241, Night Phone 4613.

SALES AND RENTALS. Used cable drilling and fishing tools, casing, production equipment; from the Southwest's largest stock of oil field supplies. Degen Pipe and Supply Co., Tulsa.

FOR SALE—300,000 feet of 10¾" OD—40# —8V LW No. 1 Grade Line Pipe. T&C or PE. Lundquist Pipe & Supply Co., 325 Wright Bldg., Tulsa, Okla. Ph. LU 5-8850.

NEED PIPE?
8" Steel, Wt. 28 lbs., beveled for welding, straight machine cleaned, coated, strictly No. 1 grade. Pittsburgh Testing Lab. report furnished.

Indiana-Ohio Pipe Co.
P. O. Box 323 Phone 3-4874
DECATUR, INDIANA

We Own and Offer

Compressors
3—IR XVG-6, XVG-4
3—Clark RA-5, RA-3

Exchangers & Heaters
4—Petrochem ½-1¼ Mil. BTU.
10—Steel 350—9,200 sq. ft.
12—Adm. 283—3,000 sq. ft.
6—St. St. & Chr. 250—1,200 sq. ft.
3—Unused U-Tube 348—1,120 sq. ft.

Vessels & Towers

'4x37' 10 Tr. 250#	18"x33' 15 Tr. 160#
8'x75' 20 Tr. 25#	4½'x17' 500#
5'x36' 20 Tr. 135#	12'x43' 25#
2'x45' 24 Tr.	5 Pkd. Towers 12"—24"

BRILL EQUIPMENT COMPANY
4101 SAN JACINTO ST., HOUSTON 4, TEXAS
JA 6-1351
2401 THIRD AVE., NEW YORK 51, N. Y.

FOR SALE EQUIPMENT

WIRE LINES—7,500 ft. new 1", 6 x 19, drilling line, left lay, hemp center . . . 7,000 ft. ⅞" 6 x 19, drilling line, left lay, hemp center. Brand new equipment priced far below list. Degen Pipe and Supply Co., Tulsa, Oklahoma.

BARREL TYPE, High pressure centrifugal pumps. 500 GPM at 1500 PSI. Never Used, excellent condition, available immediately. Jersey Engineering and Machinery Co., 65 Springdale Ave., Newark 7, N. J.

WE HAVE AVAILABLE for immediate shipment: 30,000' 1¼" Number 1 Used Smls. Upset Tubing Tested 3,000# PSI @ $37.00 CFT. F.O.B. Dallas, Texas. Valley Steel Products Co., P. O. Box 9247, 5001 South Lamar, Dallas 15, Texas.

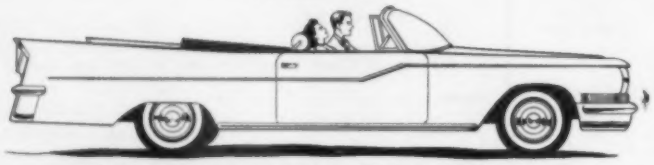
PIPE FOR SALE
7,000' of 24" OD x ⅜" Wall 94.62# New Prime National Tube Seamless, Grade B, D.R.L., Line Pipe, located Suntide Refinery Company, Corpus Christi, Texas, mill price delivered. Direct inquiries, Box 2205, Tulsa, Oklahoma.

TRAILER CAMP FOR SALE
ELDER PORTA CAMP
$37,500.00
Sleeps, Dines 28 Men

A 10 trailer integrated camp for complete mobile support of your exploration or mining program. 20,000 watt power supply. 2,000 gallon on-trailer water storage. Winterized, fully insulated, completely equipped, ready to occupy. Specifications and photos on request. Your inspection and appraisal invited.

Fox Oil Co.
Hardin, Montana

HEAD REST



FITS ALL CARS — INSTALL YOURSELF IN 5 MINUTES
NO HOLES TO DRILL — ENJOY ALL YOUR TRIPS
ALL FOR $51.50 PATENT NO. 2867434

600 SUPPLY COMPANY
MILES CITY, MONTANA

FOR SALE EQUIPMENT

PUMPING UNITS—1 H80 National double crank, crank weighted, 238,000# torque, 64" stroke with 8½ x 10 Ajax engine, and Happy starter, a complete setup at a low price. Degen Pipe and Supply, Tulsa, Oklahoma.

CARDWELL USED DRAWWORKS
Complete Rigs
2,000' to 6,500' Drilling
Terms or Rental Contract.
CARDWELL INVESTMENT CO., INC.
604 Petroleum Building
Wichita 2, Kansas
Telephone: AM 5-2611

FOR SALE
LACY AB-160 PUMPING UNIT
New Gearbox.
Price $4,500.
LACY OD-58 PUMPING UNIT,
$2,800.

Powerine Oil Company
12354 Lakeland Road
Santa Fe Springs, California
Phone RAymond 3-3357

EQUIPMENT BARGAINS

11 KINNEY ASPHALT PUMPS Jacketed Type SD422-SD534-SD848

48 HEAT EXCHANGERS,
Steel 800—4,400 Sq. Ft.
Admiralty 350—4,800 Sq. Ft.
Cupro Nickel 177—5,300 Sq. Ft.

4 BROWN FINTUBE EXCHANGERS, 189 Sq. Ft.

3 SUCTION HEATERS FINTUBE, 101-161-243 Sq. Ft.

1 AIR HEATER, 10,000 SCFM 100°-1200° Direct Fired.

1 AIR BLOWER, 11,800 CFM, 11 psi, 600 H.P. Turbine Drive.

2 TOWERS, 3' x 38'—8 Trays, 40 psi. 2'6" x 80'—34 Trays, 180 psi.

1 OTIS ELEVATOR, 2,500#, 182' Travel

1 REBOILER, 165 Sq. Ft., 150 psi. shell, 300 psi. tubes.

5 STEAM PUMPS, 8" x 4½" x 12"—4½" x 4" x 6"—8" x 4" x 6"

3 CENT. PUMPS, Vertical XP Motors
2,600 GPM at 173 Ft.—300 H.P.
1,500 GPM at 150 Ft.—125 H.P.

1 PROPORTIONEERS PUMP, 3XL, 5 H.P.

Heat & Power Co., Inc.
306 Thompson Bldg., Tulsa 3, Okla.
60 East 42nd St., New York 17, N. Y.

FOR SALE EQUIPMENT

USED PIPE AND USED TANKS—For Sale. Rogers & Wright, Incorporated, 216 West Second Street, Tulsa, Oklahoma; 710 Peoples Building, Charleston, West Virginia.

3—D80 EMSCO Pumping Units excellent condition, Casing, Tubing and Rods. Chapman Pipe & Supply. OR 7-2493, Okla. City, Okla.

2 ROTARY RIGS, 7,500' and 9,000' maximum, excellent condition, now running, liberal terms. Box L-255, The Oil and Gas Journal, Tulsa, Oklahoma.

FOR SALE—Reda Pumping Equipment—Three Pumps Complete with Motors, Protectors. Write for Details—Make Offer. Sohio Petroleum Company, Attention: J. R. Wilson, Jr., 1452 Skirvin Tower, Oklahoma City, Oklahoma.

FOR SALE—2 Bucyrus-Erie 28L Spudders, late models, with or without tools, 50 tons to pick from. Jack & H. P. Read, P. O. Box 205, Phone 385, Scottsville, Ky.

GASO—5½x10 pot valve mud pump. Mission equipped with 5" liners (Figure 1742) powered with K-428 Buda engine. Perfect Condition, $2,500.00. J. A. Finlayson, 108 E. 4th, Tyler, Texas. LY 3-3563.

IN EXCELLENT CONDITION
Sprague Sells M&S, 6 Pocket, 5 qt. Oil Can Filler, Conveyor & AC motor. Canco Type 06A, 5 qt. Oil Can Closer with motor & press type marker. New 1953, $5,500.00 for both.
ABC Model O, Top & B. Carton Gluer & Sealer (2). New 1955. $1,950.00 ea.
INDUSTRIAL UTILITIES, INC.
3013 Northmoor—TR 2-9076
Michigan City, Indiana

P.R.I. SCINTILLATORS
BARGAIN PRICES
Latest Models—Guaranteed
1—New 118B Royal Scintillator
1—New 115C Royal Scintillator
BOX L-295,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

Oil Well Fracture & Cementing Truck With Pumps, Etc.
Sacrifice, Private Party.
Dealers welcome.
JOHNSTON,
1531 Kenneth Road, Glendale, Calif.
CH 5-5917

LINDE MOLECULAR SIEVES
Types 4A, 5A, 13X, classified in many screen sizes for CHROMATOGRAPH COLUMNS; also superior Firebrick, Alumina and Silica Gel packings.
COAST ENGINEERING COMPANY
#16—14th St., Hermosa Beach, Calif.

Newly Rebuilt
Parkersburg Spudder
Better Than New
38 ft. mast. Rated at 2,500 ft. All steel welded construction. All new bearings and sheaves in crown block. New spudder gear and drive chain. Frick-Reed double clutch. 3,000 ft. ⅞-in. cable. and 3,100 ft. sand line. Moves over highway without permit. Handles range 2 pipe.
$3,950.00.
Inspect it while in Tulsa for I.P.E.
F. & L. EQUIPMENT CO., INC.
Phone DI 3-4576 or RI 3-1351
1002 No. Utica Tulsa, Okla.

EQUIPMENT WANTED

MAYHEW 2000, FAILING 1500, or, equivalent. Rotating head for air, power swivel ram BOP, tool joints, 2½ tubing, light plant. 3218 Oak Lawn, Dallas, Texas.

GAS DEHYDRATOR—Capacity 1 MCF. 4—Well Flow Intermitters. Fordee Rhoades Oil Company, 900 Mid-Continent Building, Tulsa, Oklahoma.

HELP WANTED

Petroleum Engineer
with 5 to 8 years practical field experience. Location South Louisiana. Applications will be held confidential. Apply
BOX L-270,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

Wanted:
RETIRED OIL MEN
An aggressive young management and market research company needs and wants the experienced talents of highly qualified retired oil men, equipment men and technical men who want to help us grow. Our prestige business and triple A-1 clients demand men who have the alertness of mind, objectiveness of thought and analytical abilities to help solve management, market, industrial sales and equipment problems.
THE McLAUGHLIN COMPANY
Suite 715 Exchange Bank Bldg.
100 Exchange Park North
Dallas 35, Texas

WANTED
PETROLEUM ENGINEER
Independent Oil Company has opening for graduate pertoleum engineer with three to five years' experience in field work and reservoir and evaluation engineering. Location—Calgary, Alberta. In reply please give full particulars on education, experience, personal data—including a recent picture, references, and salary expected. All replies will be confidential. Our employees are aware of this ad.
BOX L-291,
THE OIL AND GAS JOURNAL,
TULSA, OKLAHOMA.

PETROLEUM REFINERY
CHEMICAL ENGINEERS
APPLIED MATHEMATICIANS
For expanding technical activity engaged in consulting-type service to petroleum refiners. Positions involve a wide variety of projects in sales, research, refining, and company management. Excellent opportunities for persons with either or both of the following backgrounds:
A few years of refining industry experience in process engineering or economic analysis.
Experience in applications of linear programming, statistics, or electronic computing.
These positions afford professional contact with refining and process companies throughout the petroleum industry, and provide opportunity for using initiative and individual expression to increase responsibility. Detroit suburban location.
Send Resume To:
PERSONNEL MANAGER
ETHYL CORPORATION
1600 W. 8 Mile Road
FERNDALE 20, MICHIGAN

HELP WANTED

WANTED SALES REPRESENTATIVES. Now calling on engine accounts. New universal engine assessory item, non competitive, excellent promotional program. Beeco, Box 1636, Farmington N.M.

CHEMICAL ENGINEER—Chemical Plant in Central States seeks graduate chemical engineer with a minimum of three years experience in the Petro Chemical Process Industry. Willing to develop into Production Management. Send full resume and salary requirements to—Box L-264, The Oil and Gas Journal, Tulsa, Oklahoma.

FOREIGN EMPLOYMENT: Lists about 40 U. S. oil companies, 30 drilling contractors, operating abroad, showing where apply foreign jobs. $5 cash. OIML Co., Box 2603, Tulsa, Okla.

SALES MANAGER with sales engineering ability, preferably with mechanical engineering or similar college degree or equivalent. This work for Heat Transfer Field, having experience, relationship, cooling batteries, Diesel engines, Petro-chemical processes, gases, etc. Exceptional opportunity for experienced, competent man with good future, as you make it. **Box L-284, The Oil and Gas Journal, Tulsa, Oklahoma.**

GAS ENGINEER
Engineer with B. S. Degree in Chemical or Natural Gas Engineering and 2 to 5 years experience in gasoline plant construction and operation plus experience in natural gas sales. Large independent, Gulf Coast location. Some travel. Salary negotiable. Reply giving detailed information to
Box L-288,
The Oil and Gas Journal,
Tulsa, Oklahoma.

LIMITED NUMBER OF
OVERSEAS JOBS
now available for
STILLMEN
Minimum 5 years experience at responsible level on commercial scale units, preferably large size catalytic cracking.
BOILER PLANT OPERATORS
Minimum 5 years experience at responsible level in Petroleum Refinery Boiler Plant and Water Treating Operations.
INSTRUMENT REPAIRMEN
Minimum 5 years experience as first class refinery instrument repairman. Working knowledge of electronic and air operated equipment essential.
Supervisory experience helpful in all jobs. Maximum age, 50 years.
Apply Box L-278
THE OIL AND GAS JOURNAL
Tulsa, Oklahoma

TENNESSEE GAS TRANSMISSION COMPANY
Has an opening for an
ACCOUNTANT
for its foreign operations
Must have degree in Accounting with supervisory experience in oil production Accounting. Overseas experience and knowledge of Spanish preferred. Excellent benefits and opportunities. Send complete description of experience, education and family status to:
Earl R. Parker, Senior Placement Counselor
TENNESSEE GAS TRANSMISSION COMPANY
P. O. BOX 2511
HOUSTON, TEXAS
(All replies will be held in confidence)

HELP WANTED

CHIEF ENGINEER: Man with reputation in oil field equipment engineering needed by leading company. Prefer man with experience related to oil storage and oil and gas treating systems. Must be able to handle full engineering program. Salary up to $18,000 to start. Box L-290, The Oil and Gas Journal, Tulsa, Oklahoma.

OIL INDUSTRY EMPLOYMENT SERVICE, 405 Tuloma Bldg., Tulsa, Okla. GI 7-5974. We prefer work with graduate, experienced engineers, toolpushers.

WANTED: Petroleum engineers and drilling personnel for appointments overseas. If interested, contact Mr. Looper, Overseas Craftsman's Association, 426 South Spring Street, Los Angeles.

SALES MANAGER: Leading oil and gas equipment manufacturer needs experienced Sales Manager to expand its line of tanks, treating and allied equipment. Applicant should presently be in an executive sales position with high earnings. Would consider high level, aggressive man presently holding an Assistant Sales Manager's job. Beginning salary up to $30,000. Box L-289, The Oil and Gas Journal, Tulsa, Oklahoma.

SALES REPRESENTATIVES WANTED

Experienced Sales Representatives wanted to sell equipment for metering crude oil, water, and gas and for testing oil and gas wells. Remuneration on Commission Basis. Following Territories currently open: (1) Southern Louisiana, (2) Mississippi and Alabama, (3) North Texas, and (4) California. These Territories available on exclusive protected contract basis to qualified experienced men. Equipment includes Vol-U-Meters, Metering Separators, Metering Treaters, Well Testers and related equipment. Please give details concerning Sales Experience, Lines Handled, Area Covered, Personal Data, and five References in first reply to:

OIL METERING and Processing EQUIPMENT CORP.
MELROSE 5-1226 • 4843 YALE STREET
HOUSTON 18, TEXAS

Some of our Equipment will be displayed at the I.P.E. Tulsa, Oklahoma, May 14-23, at East Door of Hall of Science Building. You are invited to see our Equipment There.

BUSINESS OPPORTUNITIES

FINANCIAL CONTACT. If your proposition justifies a firm underwriting, please submit details for consideration. No shopping. Confidential. Have associate with underwriting connection. Consultant, 817—51st. St., Brooklyn 20, N. Y.

REAL ESTATE

SUB LEASE

DESIRABLE OFFICE SPACE

3,000 Sq. Ft. or Part on One Floor National Bank of Tulsa Building. Contact K. C. Fish, 2001 National Bank of Tulsa Bldg., Telephone LU 4-5996 or H. E. Canada, P. O. Box 2159, Dallas 21, Texas, Telephone RI 7-7011.

SITUATION WANTED

PETROLEUM ENGINEER—With 10 years of varied experience in secondary recovery, property evaluation, reservoir analysis, drilling, workovers, completions, and production operations, in Texas, Oklahoma, Illinois, desires position with aggressive independent. Box L-296, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER—36, registered, eight years production engineering Gulf Coast, West Texas, and Mid-Continent. Desires work in drilling, completion, or production with small or medium size company. Box L-297, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM ENGINEER: Age 39, 10 years' experience, reservoir engineering, drilling, production with major company. Desires superintendent or engineering position with aggressive independent. Box L-293, The Oil and Gas Journal, Tulsa, Oklahoma.

PLANT OR OPERATING Superintendent: M.S. Chemical Engineering. Age 44, married. 20 years experience in design, construction, operation, research, Petroleum and Petrochemical refineries, including gasoline, fuel oils, lube oils, aromatics. Last 3 years as Assistant Refinery Superintendent. Desire connection with progressive company. Box L-292, The Oil and Gas Journal, Tulsa, Oklahoma.

ATTORNEY-ENGINEER. 5 years engineering experience and 6 years refinery process supervision experience. Professional engineers license. Recently admitted to Bar. Veteran, married, age 32. Challenging and responsible management position desired. Resumé and references available. Box L-296, The Oil and Gas Journal, Tulsa, Oklahoma.

PET. ENGR. Refinery Major, 38. Experience Gas Processing & Sales. Desires responsible position. E. F. Jernigan, 3414 East 39 Street, Tulsa, Okla.

ATTORNEY, six years experience in the fields of oil and gas law and taxation, LL.M. (taxation) from New York University. Resume available. Box L-286, The Oil and Gas Journal, Tulsa, Oklahoma.

LANDMAN-LAWYER: Capable; wants heavier load; 7 years leasing, titles, unitization, gas contracts, Rockies-Texas; resume. Box L-285, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST, MS., 31, single, 6 years surface and subsurface exploration experience both foreign and domestic. Desires domestic or foreign employment. Box L-276, The Oil and Gas Journal, Tulsa, Oklahoma.

GEOLOGIST: 4-years experience Mid-Continent area. Presently employed. M. A. Degree. Will relocate. Box L-274, The Oil and Gas Journal, Tulsa, Oklahoma.

PETROLEUM GEOLOGIST—Desires Geologic employment with major oil company or independent. Will consider any offer. One year experience in South Texas, North Dakota, Alberta, with well logging unit; including sample analysis. Veteran, 26, single, B.S. Biology, B.A. Geology. Box L-263, The Oil and Gas Journal, Tulsa, Oklahoma.

PRODUCTION WANTED

WANTED: Oil properties. 100 to 5,000 barrels daily in Oklahoma and Kansas. Morris Sitrin, P. O. Box 1160, Tulsa, Okla.

TO CHANGE YOUR ADDRESS

IT'S BEST . . .

to send your old address clipped from the Journal mailing wrapper along with your new location.

ADVANCE NOTICE . . .

10 days before you move, and we guarantee you week-to-week undelayed service.

WRITE . . .

Circulation Department

THE OIL AND GAS JOURNAL
Box 1260 **Tulsa 1, Okla.**

LEASE AND DRILLING BLOCKS

KENTUCKY Western Pulaski County—Along Russell County Line—3 blocks 2,100 Acres, 1,500 acres—10 year term—Low rental price $2.00 per acre 1/8 over ride. Box L-273, The Oil and Gas Journal, Tulsa, Oklahoma.

LEASES 2,862 ACRES in one nice square block, in West Virginia, for sale, reasonable. For information contact Victor G. Neely, Elba, Ohio.

WILL TRADE West Texas royalty valued $50,000 on Louisiana area ranch, must be well improved and productive. Will consider $100,000 property. Box 101, Ponca City, Okla.

WANT SHALLOW ACREAGE for three well test program, offset or extension, preferably farmout. Write U. S. Anderson, 8350 Santa Monica Blvd., Los Angeles 46, California.

1/8 INTEREST in 40 acre offset to production five hundred seventy-five feet well, Sorona sand. Well ready to drill—Box 628—Okmulgee, Oklahoma.

FOR SALE—Small interest in Spraberry Field, Midland County, Texas, and a perpetual mineral interest in Dickens County, Texas. Joseph Moliterno, 25-85 36th Street, Astoria 3, L. I., New York.

WATER FLOOD PROSPECT for immediate sale: NW1/4 14-31S-16E and W3/4 SW1/4 14-31S-16E. 280 acres, Montgomery County, Kansas. Entire working interest. No override. Six Bartlesville wells, pumping, electrified. T. D.—850 ft. Core analysis on five wells. Best offer takes. Robert S. Randolph, First National Bldg., Tulsa, CHerry 2-6137.

KENTUCKY BOOM AREA. Desire contact with large contractor. 400 acres Russell County. Producing wells in 1920's. Contact Lawrence Coffey, Jamestown, Ky., telephone (Russell Springs) UNion 6-4268.

OIL AND GAS LEASE for sale on my 1,810 acre tract in Sections 28, 29 & 30, Township 4N and Range 17 East of the Indian base Meridian, Pittsburg County, Oklahoma. $2 per acre bonus and $1 per acre rental. Manuel Rudy, 3818 Canal Street, Houston 3, Texas.

NO MARKET FOR USED EQUIPMENT

The Market is There Alright,

Its just harder to find . . . the man that wants what you have to sell.

BUT you can find him quickly and inexpensively by telling him in **The Oil and Gas Journal's** Classified pages . . .

BECAUSE the Journal reaches into every nook and cranny of the industry . . . and our subscribers **READ** the Classified Section.

Undisplayed Rates 26¢ per word
Displayed Rate $18. per Col. in.
10% discount for running in 3 consecutive issues. Write:

The Oil and Gas Journal
P. O. Box 1260, Tulsa, Okla.
or, if you live in a western state, Write:
The Oil & Gas Journal,
Classified Departments, Inc.
4041 Marlton Ave.,
Los Angeles 8, Calif.

LEASE AND DRILLING BLOCKS

PRODUCTIVE Edwards Gas Royalty under shut in deep Edwards Gas Well on large tract southwest Texas. Box L-372, The Oil and Gas Journal, Tulsa, Oklahoma.

Government of British Honduras

Oil Prospecting Licenses Over Crown Oil Rights

An area of approximately 5,600 square miles of Crown oil rights situated north of the Maya Mountains in British Honduras is now available for oil prospecting under the terms of the Oil Mining Regulations.

The territory available for exploration has been divided up into 44 prospecting license areas of approximately 200 square miles each, shown on the map available from Crown agents representative, 1800 K St., N.W., Washington 6, D. C.

Prospecting Licenses are issued for an initial term of four years and may be extended for a further term of one year. Each licensed area is subject to working obligations to be agreed between the Director of Surveys and the Licensee and will include geological and/or geophysical survey and/or test drilling. A minimum obligation will be the maintenance, after the first year of a license or licenses, of one drilling rig in continuous operation for each 1,000 square miles or part thereof held by a licensee.

Subject to the due performance of the working obligations, on the termination of a prospecting license, a licensee has the right to select a part or parts of the licensed area not exceeding in aggregate one half of the area held under license for conversion to a mining lease. Mining leases are for an initial term of 30 years, they do not carry any working obligation but are subject to a scale of dead rent increasing from 50 cents per acre per annum in the first year to three dollars per acre per annum in the tenth and subsequent years. This dead rent may be offset against any royalties which may be payable.

Royalties of 12½% of the agreed value of all crude oil and of casing head petroleum spirit produced are payable in respect of both prospecting licenses and mining leases.

Copies of the Oil Mining Regulations together with the forms of prospecting license and Mining lease may be had on application to the Assistant Secretary, Natural Resources, Belize, British Honduras, to whom applications must be submitted by the 31st May, 1959.

BUSINESS SERVICE

Delaware Corporations formed and serviced. American Guaranty & Trust Company, P. O. Box 487, Wilmington, Delaware.

Venezuelan Contact

Do you need Venezuelan Contacts, Representations, Surveys or "local know-how," if so write

TEN EYCK HULL

Edificio Galipan — Caracas, Venezuela
Cable: CALLHULL — Telephone: 33-31-95

LEGAL

U. S. DEPARTMENT OF THE INTERIOR, Bureau of Land Management, Washington 25, D. C. Notice is hereby given that 160 acres of land described as the S½SE¼ Sec. 2, E½SE¼ Sec. 11, T. 21 N., R. 16 W., Louisiana Meridian, Louisiana, within the known geologic structure, undefined, of Caddo-Pine Island Field will be offered for oil and gas leasing in one parcel through competitive bidding to the qualified bidder of the highest cash amount per acre at 1 P. M., E.S.T., May 6, 1959, when bids will be opened. Bids may not be modified or withdrawn unless the modifications or withdrawals are received prior to the time fixed for opening of the bids. Details of the lease offering, how and where to submit bids, may be obtained from the Bureau's Eastern States Land Office, Washington 25, D. C. H. K. Scholl, Manager, Eastern States Land Office, Washington 25, D. C.

ADVERTISERS
in this issue

A
Airaterra ... 152
Ajax Iron Works ... 25
Allen-Bradley Co. ... 50
Allied Chemical—Plastics and Coal Chemicals Division ... 42
American Recording Chart Co. ... 146
Anderson Company, The V. D. ... 161
Axelson Manufacturing Company, A Division of U. S. Industries, Inc. 40, 41

B
Baash-Ross Division of Joy Manufacturing Company ... 35
Baker Oil Tools, Inc. ... 54
Baroid Division, National Lead Co. ... 112
Bethlehem Steel Company ... 142, 143
Supply Division ... 71
Black, Sivalls & Bryson, Inc. ... 29
Braden Winch Company ... 44

C
Cameron Iron Works, Inc. ... 148
Chicago Bridge & Iron Company ... 33
Chiksan Company ... 79
Classified Advertising ... 196, 197, 198
Coates Field Service, Inc. ... 128
Colorado Fuel and Iron Corp. ... 130, 131
Continental-Emsco Division, a Division of The Youngstown Sheet and Tube Company ... 36, 37, 162 Through 167
Core Laboratories, Inc. ... 168
Corrosion Services Incorporated ... 175
Crose Manufacturing Co., Inc., M. J. ... 126

D
Dallas Manufacturing Co. ... 178
Darling Valve and Mfg. Co. ... 110
Dorr-Oliver Incorporated ... 56
Dow Chemical Company, The ... 156
Dowell ... 1, 139
du pont ... 24

E
Edward Valves, Inc. ... 135
Elder Trailer and Body, Inc. ... 177
Elliott Motors, Inc., Ken ... 180

F
Fifth World Petroleum Congress Exposition ... 144, 145
First City National Bank of Houston 122
First National Bank of Shreveport, The 170
First National Bank & Trust Co. of Tulsa, The ... 140
Foxboro Company, The ... 5

G
General Paint Corp. ... 128
Gorman-Rupp Company, The ... 174
Goulds Pumps, Inc. ... 43
Grinnell Company, Inc. ... 7

H
Halliburton Oil Well Cementing Co. ... Inside Front Cover, 12, 13, 75
Hill, Hubbell and Company ... 27
Houdry Process Corporation ... 98, 99
Houston Contracting Company ... 147
Hughes Tool Co. ... Back Cover
Humble Oil & Refining Co. ... 22
Hycalog, Inc. ... 134

I
International Harvester Co. ... 116, 117
International Paints (Export) Ltd. ... 135

J
Johnston Testers, Inc. ... 49
Jones & Laughlin Supply Division 182, 183

L
Leland Equipment Co. ... 149
Liberty Mutual Insurance Company 189
Link-Belt Company ... 21
Loeb, Rhoades & Co., Carl M. ... 178
Lone Star Steel Company ... 108, 109
Lunkenheimer Co., The ... 23

M
Macco Oil Tools Co. ... 138
Magnet Cove Barium Corp. ... 8, 9
Marsh Instrument Co. ... 32
Mayo Hotel, The ... 161
McKissick Products Corporation ... 129
Mid-Continent Supply Company ... 26
Minneapolis-Honeywell Regulator Co., Industrial Division ... 150, 151
Mission Mfg. Company ... 121
Mixing Equipment Co., Inc. ... 104

N
National Airoil Burner Co., The ... 148
National Supply Co., The ... 179
National Tank Company ... 200
Norris Manufacturer, Inc., W. C. ... 4

O
Oil Center Tool Co. ... 31
Oil Well Supply Division ... 6
Orbit Valve Company ... 101

P
Paris Distributor, Inc., Henry H. ... 159
Penn Controls, Inc. ... 141
Petroleum Distributing Co. ... 133
Philco Corporation ... 20
Phoenix-Rheinrohr AG ... 160
Portable Treaters ... 138
Price Company, H. C. ... 52
Procon Incorporated ... 30

R
Reda Pump Company ... 118
Republic National Bank of Dallas ... 118
Republic Rubber Division of Lee Rubber & Tire Corp. ... 38
Republic Steel Corporation ... 154, 155
Republic Supply Company ... 17
Robbins & Myers, Inc. ... 184
Rockwell Manufacturing Company, Instrument Division ... 34
Ross-Martin Co. ... 134
Royal Bank of Canada, The ... 11

S
Sargent Engineering Corporation ... 73
Servco ... 47
Shaffer Tool Works ... 136
Shamban & Company, W. S. ... 48
Smith Corporation, A. O. Tubular Products Division ... 124, 125
Smith Oil Tools Co., H. C. ... 132
Southern California Oil Tool Company 134
Southwestern Graphite Co. ... 181
Stone & Webster Securities Corp. ... 177
Strahman Valves, Inc ... 144
Stran-Steel Corporation ... 51

T
Texas Employers Insurance Association 45
Thompson Tank & Manufacturing Co., Inc. ... 126
Tube-Kote, Inc. ... 158

U
United States Rubber Company ... 19
United States Steel Corporation—Oil Well Supply Division ... 6
Universal Oil Products Co. ... 14, 15, 39

W
Wagner Electric Corporation ... 18
Waukesha Motor Company ... 10
Well Equipment Mfg. Corp. ... 16
Weston Instruments, Division of Daystrom, Inc. ... 157
Williams Brothers ... 46
W-K-M Division of ACF Industries Incorporated ... 28
Wyatt Metal & Boiler Works ... Inside Back Cover

Y
Youngstown Sheet and Tube Company ... 102, 103

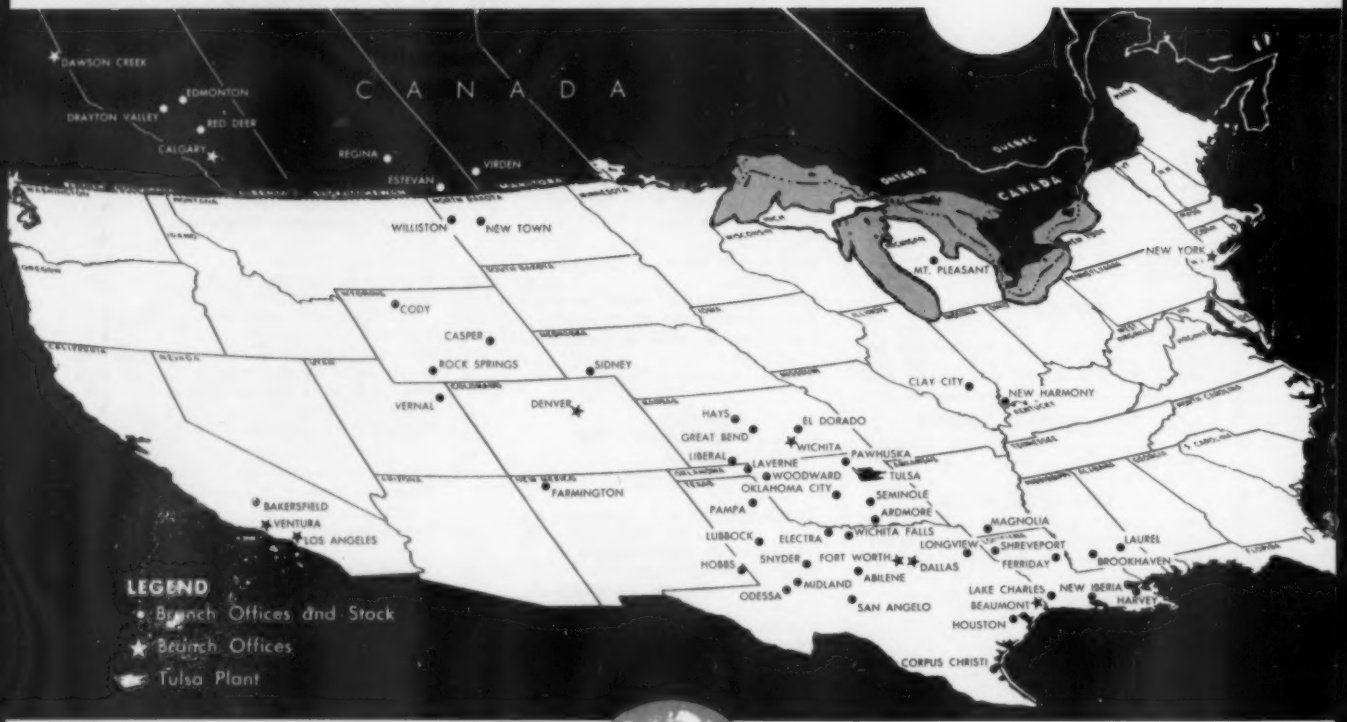
TANKS

when you think of tanks . . .
think of **NATIONAL®**

National Tank Company offers you the best in engineering, fabrication, installation and service.

This map locates National's own branch offices, wareyards and crew bases. When you need tanks for GRAIN, CEMENT, OIL, WATER OR ANY GRANULAR OR LIQUID MATERIAL — CONTACT YOUR NEAREST NATIONAL OFFICE*.

**You'll find NATIONAL TANK COMPANY listed in the white pages of your telephone book.*



*National Supply Co.
Export Division
New York City

It's a National®

*National Sales Co.
in California

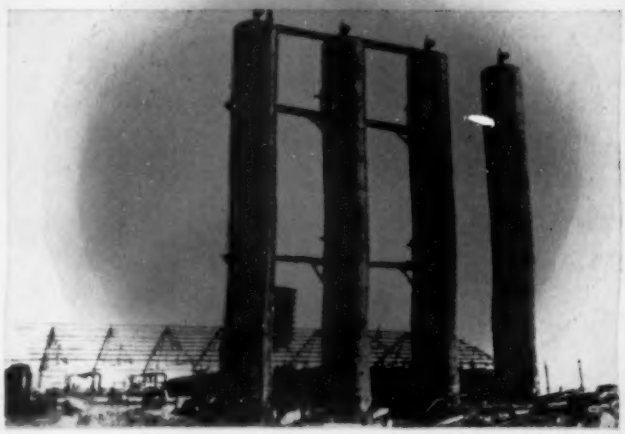
NATIONAL TANK COMPANY

DRAWER 1710
TULSA, OKLAHOMA

DOMINANT *THEN AS NOW*

In the quarter century since this advertisement was printed, Wyatt Metal & Boiler Works, Inc. has grown to international status with four fabrication plants which have "furnished all the steel plate work" for scores of natural gasoline plants over an area manyfold greater than two counties in Texas.

WYATT METAL & BOILER WORKS



4 7'x60' Absorber Towers in Hanlon Gasoline Plant at Breckenridge

We have furnished all the steel plate work for thirty-one Absorption Gasoline Plants erected in Eastland and Stephens Counties, Texas, within the past eighteen months.

The work has included more than one hundred Absorber Towers and 200 Pressure Storage Tanks in addition to Dephlegmators, Accumulators, Stills, Vent Tanks, etc. Not one failure in the plate work in all the list has been reported.

We solicit inquiry for all classes of plate work requiring skilled and experienced construction.

Wyatt's DALLAS

Wyatt Metal and Boiler Works

Dallas, Texas

Printed in Refiner and Natural Gasoline Manufacturer (now Petroleum Refiner) May, 1924.

Wyatt's
HOUSTON - DALLAS
CORPUS CHRISTI - MEXICO CITY

WYATT METAL & BOILER WORKS, INC.

SALES OFFICES

Houston • Dallas • Tulsa • Pittsburgh
Philadelphia • New York • Corpus Christi
Los Angeles • Mexico City

Subsidiary
Wyatt's Plastics, Inc.
Houston and Wallis

Affiliate
Wyatt de Mexico S.A. de C.V.
Mexico 1, D. F.

MANUFACTURERS AND ERECTORS SINCE 1913

For 50 years Hughes has pioneered every advance in cone-type rock bits

Starting with the first Hughes bit in 1909, that introduced the principle of rolling conical cutters, every major breakthrough in cone-type rock bit design has been pioneered by Hughes.

And for three very significant reasons:

1) A first-hand knowledge of the needs of the industry gained in the field.

2) A continuing research program devoted to improving rock bit performance and drilling techniques.

3) The industry's greatest experience in designing and manufacturing rock bits.

Today, you can look to Hughes, as the industry has for 50 years, for leadership in developing rock bits that will enable you to get maximum performance out of your drilling equipment.

50 YEARS 1909 1959

HUGHES TOOL COMPANY

50TH ANNIVERSARY YEAR 1909 – 1959